ENVIRONMENTAL ASSESSMENT BOARD

Ontario

ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 176

DATE: Monday, January 11, 1993

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act, R.S.O. 1980, c. 140, as amended, and Regulations thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro consisting of a program in respect of activities associated with meeting future electricity requirements in Ontario.

Held on the 5th Floor, 2200 Yonge Street, Toronto, Ontario, Monday, the 11th day of January, 1993, commencing at 9:00 a.m.

VOLUME 176

B E F O R E :

THE HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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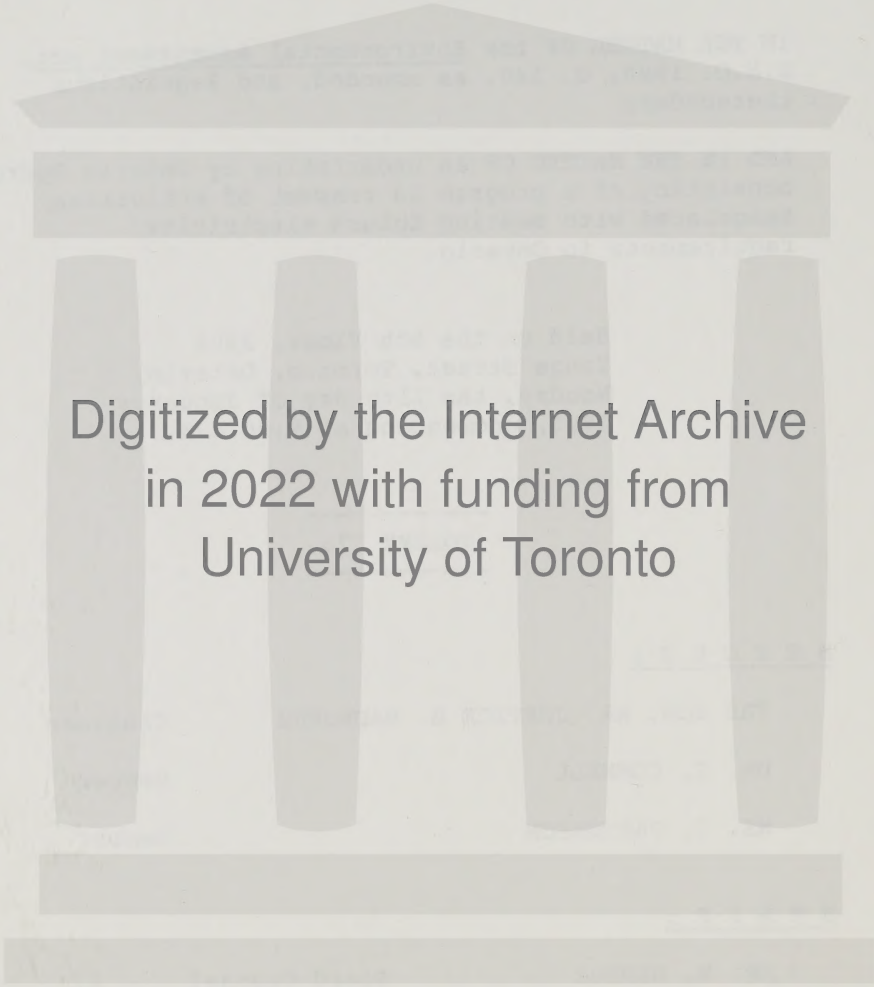

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---Upon commencing at 9:03 a.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Please be seated

THE CHAIRMAN: Since we last met there have been some further exhibits filed, the details of which will appear in the transcript of the day. They have been given numbers 1018 to 1021.

---EXHIBIT NO. 1018: (MRJBC), Witness Statement of Stan Louttit.

---EXHIBIT NO. 1019: (MRJBC), Witness Statement of Chief Randy Kapashesit.

---EXHIBIT NO. 1020: (South Bruce), South Bruce Witness Statements.

---EXHIBIT NO. 1021: (Sierra Club and Cultural Survival), Testimony on Manitoba Purchase and Related Transmission, Dr. John Theberge, January 4, 1993.

THE CHAIRMAN: Mr. Shepherd?

MR. SHEPHERD: Mr. Chairman, we are waiting for an exhibit to be copied for the Panel, and in any case I think one of the witnesses is not here.

THE CHAIRMAN: We are missing one panelist, I have noticed.

MR. B. CAMPBELL: I assume that all of the reports on the effects of the weather on traffic are affecting the travel of our more far-flung member. I will attempt to determine exactly what is happening.

If it is more convenient, Mr. Chairman, perhaps we could just let the Board know once he arrives.

THE CHAIRMAN: Okay.

THE REGISTRAR: Please come to order. This hearing will recess until recalled.

---Recess at 9:05 a.m.

---On resuming at 9:09 a.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Please be seated.

THE CHAIRMAN: Mr. Shepherd?

MR. SHEPHERD: Thank you, Mr. Chairman.

AMIR SHALABY;
PAUL BURKE;
KEN SNELSON;
BRIAN DALZIEL; Resumed.

CROSS-EXAMINATION BY MR. SHEPHERD (Continued):

Q. Mr. Burke, when we ended the day on Wednesday we were talking about the natural NUG forecast.

As I understand what you have said, the municipal electric generation is not in there, right, what has been called - excuse me, my throat has decided not to work this morning - what has been called MUGs or 'municipal utility generation' is not in your natural NUG forecast; right?

MR. BURKE: A. There is no growth in it.

Q. Okay. And we didn't nail down the industrial NUGs component I guess, at least not from my point of view, perhaps from yours, because we had a little problem with the Falconbridge issue. You recall that discussion about Falconbridge and Kidd Creek?

A. Yes.

Q. I would like you now to turn to Exhibit 798, which is a filing by the Association of Major Power Consumers. I am asking you to look at tab 5 of that exhibit, which I understand you have copied and before you. And the last page of that -- we have given you the whole tab so that you can check all the context, if you wish.

The last page of that -- this is headed up "Potential Future Energy Savings, Kidd Creek", and under the sub-heading "Cogeneration Initiative" it talks about a plant of the size 150 megawatts to 175 megawatts.

Now, I am not going to ask you whether that capacity is correct or whether it fits with their load because obviously you have to maintain customer confidentiality.

What I do want to ask is this. Does the 300 megawatt increase from 1991 to 1998 in your natural

NUG projection, is that estimate sufficient in your professional view to account for the entire industrial NUG strategy, industrial NUG category, if this 175 megawatts is installed at Falconbridge? Is your estimate still enough?

A. The judgment of the people in the NUGs division who advised me on what the order of magnitude of the load displacement NUG forecast should be was that there were a large number of projects of various sizes that had different probabilities of proceeding, and they were comfortable with the number of 300 megawatts as the likely resultant of all of those.

They certainly are aware of this project because it has been on the books for quite a while as a potential load displacement NUG initiative. So the forecast we have is a combination of initiatives like this one and the probabilities, subjective probabilities, because that is what they have to be, that these will proceed.

Q. Mr. Burke, did you find out since last Wednesday that it has been on the books for some time?

A. No.

Q. Didn't you say last Wednesday you

didn't know anything about a cogeneration initiative at Kidd Creek? Did I just misunderstand you then?

A. I think you must have, yes.

Q. Okay, I'm sorry. And also following up on that, I had understood that you did this forecast of natural NUGs using a functional model; that is, you used a mathematical equation, as I understood it. Now you are talking about the NUG division. Could you explain the relationship between the two?

A. I think I also said on Wednesday - I would have to check the transcript to be sure - that the equation was used in conjunction with advice about the likely load displacement NUG takeup in the next few years.

In fact, the way -- one of the criteria for going with this equation was that it produced in the short term estimates that were consistent in broad terms with the sorts of numbers that people familiar with the load displacement NUG industry as it currently stands in Ontario think is feasible for NUG impacts in the next few years.

Q. It sounds like the NUG division sort of did a sanity check on the result of your equation. Is that a fair assessment?

A. We worked closely with the NUGs

division right through this process.

THE CHAIRMAN: I think in Panel One this was gone into quite a bit about the relationship with their NUG forecast and the work and interrelationship with the NUG division. I think that was discussed quite extensively in Panel One.

Has that process changed in any way?

MR. BURKE: No.

MR. SHEPHERD: Mr. Chairman, you are recalling a discussion with respect to the natural NUG forecast in Panel One?

THE CHAIRMAN: Well, I'm not going to be that precise. I recall extensively Mr. Burke talking about in preparing that forecast working together with the NUG division, and that there was a fair amount of evidence about that.

MR. SHEPHERD: Q. Mr. Burke, we have been talking about natural NUG increases from a 1991 base; correct? That is what this discussion is?

MR. BURKE: A. Yes.

Q. But it is now 1993, and presumably there have been projects built or committed since 1991; correct?

A. I think we are talking about what might have happened during the course of 1992?

Then, my understanding is that very little has actually come in service in the course of '92, but I could check for you.

Q. That is not what I asked. I asked built or committed.

A. Okay. The committed, again I could check for the dates of commitment, but I'm not aware exactly of what point in time projects are committed. The estimate though of 300 remaining is still valid from the 1991 base. I don't know how much of the 300 is already committed.

Q. In fact, you don't even know whether more than that is committed, do you.

A. I know that considerably less is committed in total.

Q. Okay. I'm sorry?

A. I understand the total of around 77 megawatts is committed, subject to check, but I don't know exactly when those particular projects were committed.

That is the knowledge that again the NUGs division people have about commitments of this sort, and frankly, I'm not exactly sure what committed means in the case of a load displacement NUG. It is obviously an investment decision in the hands of the

people who wish to make it. They can put it on hold at any time that they wish, they can proceed more rapidly as --

I don't really think it is quite as firm as if Hydro goes for an Order in Council and suddenly is in the process of construction.

Now actually, looking at my notes I only have 40 megawatts either committed or under construction right now in the load displacement NUG category.

Q. Is that natural or is that program-driven?

A. 20 megawatts of that was program-driven.

[9:17 a.m.]

Q. So then, I -- I don't want to push this too far. I guess I'm just trying to understand what you're saying. If we take out the 20 megawatts of program driven, then if I understand what you're saying, since the end of 1991, 20 megawatts of natural load displacement non-utility generation has been committed, I guess, or more during that time; is that right?

A. Well, no. What I'm saying is they're under construction. Twenty -- my information, as I

understand what was given to me, 20 megawatts is now under construction for natural load displacement NUGs.

Q. Okay. And then you have no procedure, as I understand it, for tracking the extent to which your industrial customers have committed to self-generate; is that correct?

A. The -- the best we have is an annual load forecast survey that goes to each of our industrial customers, and, in fact, each of our customers at which time we ask them what they project their needs for peak demand to be, and we also include a survey at the back of that load forecast questionnaire, which asks about their intentions for load displacement non-utility generation. And we have to assess what to make of the information we get, whether the company has included everything that they intend to do or whether they have included more than they intend to do, but this has been going out, the actual survey to our customers for their load forecast has been going out for 30 years. The questions about cogeneration or other events which could cause them to draw less power from us than they currently do, those questions have been asked for pretty well as long as that. But, again, the contents of their answers are confidential.

Q. Do you have a total from that survey? That's not confidential, right?

A. A total of what?

Q. Total of natural, or self-generation I guess we can call it, that your industrial customers say that they've -- that they're considering going ahead with?

A. There are, as I said earlier, a large number of projects that people have indicated - not a large number - there are a number of projects that people have been indicating over the years that they may go ahead with, and in coming up with a forecast, we apply probabilities to the likelihood that they will actually proceed.

I don't do that myself. I rely on the advice of the non-utility generation people to come up with the expected result of the various possibilities that people propose in the responses to us, and the non-utility generation people have their own sources of information directly with the customers.

Q. I understand that the customers won't necessarily all proceed with their projects; but do you know what that total is that I asked you for?

A. No. I don't have that total right with me, no.

Q. Could you provide it to us?

A. For the 1992 customer survey?

Q. The latest information you have; sure.

A. I will as long as it would not be presented in such a way as to violate confidentiality concerns; in other words, if there are not very many projects, I'm not goung to give you the total.

Q. Sorry. Why is that?

A. Well, I think there's a practice that you certainly would not present information from confidential sources unless at least three items were on the list, so that one would not be able to identify individual components of the list. I'll have to make sure that, in fact, the way the numbers are presented, the confidentiality of the parties is preserved.

MR. B. CAMPBELL: Subject to ensuring that confidentiality, Mr. Chairman, could we have an undertaking number?

THE REGISTRAR: 940.3.

THE CHAIRMAN: That is 940.3, I believe.

---UNDERTAKING NO. 940.3: Ontario Hydro to provide, subject to ensuring confidentiality, the total of natural, or self-generation projects that industrial customers say they are considering going ahead with, from the Annual 1992 Load Forecast Survey.

MR. SHEPHERD: Q. Now, Mr. Burke, I'm still in Exhibit 798, and I'm going to ask you to turn to Chart 4 of that. And, firstly, the pages aren't numbered in it.

THE CHAIRMAN: Tab what?

MR. SHEPHERD: This is tab 5, Mr. Chairman, of Exhibit 798. The witnesses only have that tab because they don't have the whole exhibit.

Q. And Chart 4 is only about half way through. Do you have that, Mr. Burke?

A. The one titled, "Kidd Creek 1991 Energy Consumption"?

Q. Correct.

A. Yes.

Q. And there it says that the unit cost of electricity for Kidd Creek is 4.2 cents per kilowatthour. That's right at the low end of your spectrum of prices to customers, isn't it?

A. I don't know what all they've factored into that, and I don't offhand know whether this would include an interruptible rate contract and that sort of thing. It must be the average price they pay.

Q. In your range of charges per kilowatthour that you charge to industrial customers,

that's at the low end of the range, isn't it?

A. Let me check.

Well, looking at the retail energy price trends, large direct customers for 1991 on average paid 4.4 cents per kilowatthour, so this is slightly below that.

Q. Sorry, 4.4?

A. That's what it says on page 35 of Attachment E of Exhibit 793 --

MR. SNELSON: A. 796.

MR. BURKE: A. 796.

Q. Okay. Well, I wonder if you could turn to page 2 of Attachment E then, and you see there where it says Industrial, bracket, Large Sector in that chart?

A. Yes.

Q. And it looks to me like it says 1991 actual was 4.66 cents.

A. Yes. It's an average.

Q. Okay. Well, didn't you just say the average was 4.4 cents, or is that --

A. For large direct over 5,000 kilowatthours a year.

Q. Isn't that the same as this?

A. No. If you see on page 35 there are

various categories. The number that you've found is under all large industrial.

Q. Oh, I see. So the actual number in '91 is 4.41 cents?

A. Yes. That's what I said a minute ago.

Q. Oh, sorry. So they are at the low end of the range then?

A. I don't think you can conclude that from this. I can tell you they're below average. There may be other industrial customers, larger volume, choosing to buy in off-peak hours more, and so on, that pay less.

Q. I assume if the average is 4.41 cents and Falconbridge is paying 4.2 cents, there are people paying more than 4.41 cents in the large direct category; correct?

A. Oh, that's true.

Q. Good. Yet, as I understand this filing with respect to Falconbridge, it's Exhibit 798, they appear to have done a cut of the economics of their cogeneration project and found -- they've termed it "sufficiently positive". I guess my question is: If Falconbridge, with a below average cost of electricity, gets a positive response to economics for

cogeneration, would that suggest to you as an expert that other customers who pay the average cost or pay higher than average cost are likely also to have fairly good economics for cogeneration?

[9:30 a.m.]

A. I think the current price of electricity has very little to do with the economics of cogeneration.

What it really turns on is what people expect over five, 10, 20 years to be paying for electricity and natural gas, and it really comes down to the judgments of the people doing the financial analysis in each case, what they expect the price of electricity to be.

I think that the economics must be pretty marginal at today's prices, and the issue must depend a lot on whether the expectations in the study that was done or is being done for Kidd Creek are considered realistic by the people who choose to finance this. I have no idea what is in that study, but the economics must be pretty marginal at today's prices.

Q. Why do you say that? You have analyzed the economics?

A. No, just that the -- I have only a broad or rough appreciation of what the relativity

between electricity and gas prices would have to be to make the project economic. But really, I'm judging by the fact that they had difficulty or seemed to have difficulty obtaining financing at the current time for this project. It is no more than that. The project has been on the books for some time as a possible cogeneration facility, and it hasn't proceeded so far.

Q. Will you tell us about the difficulty in financing that you testified to?

A. I have no information at all. I just read in the newspapers recently.

Q. Your natural NUG forecast projects a penetration rate of about 3 per cent or so, right, over the next decade?

A. Sorry, I don't know where that number comes from.

Q. Well, you are projecting 300 megawatts of additional natural NUGs; right? And what is your total industrial load in megawatts?

A. I don't believe there is a number on the record for the total industrial load in megawatts. I think we have an energy forecast.

Q. It is about a third of your energy?

A. About, yes.

Q. Your system is about a

30,000-megawatt system?

A. No. Current peak is around 22,000 megawatts, and industrial load factor is in excess of the system average. I just don't think there is a number in the record for the industrial capacity in megawatts.

Q. But, Mr. Burke, I didn't ask you to look it up; I asked you what it was. Do you know what it is?

A. No, I don't have an estimate off the top of my head. No.

Q. Do you know what your estimated penetration rate is for natural NUGs over the next 10 years?

A. Well, I look at it in energy terms, and we are adding about 3 terawatthours, and total industrial load is currently about -- let me just check...about around 40, 42 terawatthours. Looks like about 7 per cent of the energy.

Q. So about 7 per cent penetration rate then for load displacement?

A. In total.

Q. In total.

A. That does presume that all of the LD NUGs are I guess strictly industrial, they may be large

commercial customers potentially.

Q. Well, didn't you testify that you only have an industrial number?

A. Yes. What I meant by "industrial" is -- includes large service industries as well. In the industrial classification you have goods produced and you also have service industries. It can include hospitals and that sort of user of electricity as distinct from municipal utilities who are our customers.

Q. I am just confused about this industrial. This is the same industrial category we have talked about lots of times before; it is not new for this purpose?

A. The industrial sector for the load forecast is not new. When I have been talking about LD NUGs as being industrial as opposed to municipal utilities, 'industrial' in broad terms does allow the inclusion of some SICs that are in the commercial sector.

Q. Do you have an industrial category in your end use forecast?

A. Yes.

Q. In EEMO. Is it the same category that we are talking about here with NUGs?

A. For the most part it is. But I guess I am just pointing out to you that the standard industrial classification includes commercial sector industries as well, and they may turn out to be load displacement NUG possibilities.

We are dealing with slight variations of the term 'industrial'. Sometimes people call goods producing industries, some call it service industries; I in general am talking about industries when I am talking about LD NUGs.

Q. But you are including things like hospitals?

A. Yes, and universities.

Q. Nowhere else in any of this stuff have we seen that included in the industrial category, have we?

A. No, I admit this is a distinction I am making as far as it pertains to load displacement NUGs to distinguish it from municipal utilities. I said 'industrial use' and I wasn't confining myself to only goods producing industries in doing that.

But it is not a large chunk in what would be defined in the commercial sector, but there are definitely some small load displacement NUG possibilities going ahead in some of the larger service

sector buildings.

Q. Of course, this projection that we are talking about, it is based on historical data; right?

A. Yes.

Q. Historical data is all industrial self-generation; correct?

A. I think that's correct, yes.

Q. So when you say that your forecast includes things other than industrial, other than that conventional industrial, how could it do that if it is based on data that doesn't include that? That is not right mathematically, is it?

A. Well, the, hmmmm... I think if you check the data sources that the -- what we have done is we have used the industrial data, which is the only data available, and we have projected from it.

But the base amount of energy that we use in 1991 is an amount that has been calculated to be a realistic estimate - realistic? - our best estimate of the total amount of energy used in load displacement NUGs in Ontario, which is somewhat larger than the Statistics Canada estimate of energy in their data set.

But I'm not going to claim that that is because we have included some of these commercial

sector ones. It is just we find their numbers to be surprisingly small for the amount of energy generated by industry.

So for the base year, I believe it was 1990, we produced our own estimate as the starting point for this analysis that we did, but the relationship which we wanted to get from the equation - that is, the various elasticities of how the amount of energy responds to changes in price - that was done purely with industrial data as Statistics Canada has it. You are quite right.

Q. And is it correct, Mr. Burke, that if your data set is one category, you cannot - without some additional analytic step - you cannot project into the future for a different data set; correct?

A. Well, it really comes down to making a judgment as to whether the nature of the cogeneration facilities, the economic decision is any different for a large hospital or an industrial site, and I don't think it is.

Clearly, in all cases there are site-specific considerations about the amount of cogeneration that can occur and all that sort of thing, but the broad economics of the cogeneration facility are similar, whether it happens to be in a commercial

building or an industrial plant.

Q. So I presume, therefore, that with that amendment your penetration rate, which you estimated at 7 per cent, is actually overstated?

A. That is why I made the qualifier. It is possible that some of that may not occur in the industrial sector per se as defined for the end use model.

Q. Okay. And, of course, you also have to adjust your penetration rate for the fact that you are expecting load growth; right?

A. Well, you are the one who introduced the penetration rate. I have just tried to tell you what the total current load in the industrial sector was and what the increase in energy associated with load displacement NUGs is and take a ratio for you.

But the concept is not one that I had introduced, and I am -- you know, wouldn't necessarily use it. I'm not sure what you want it for. So if there is a particular calculation you would like me to make I'll make it.

Q. Okay. Well, you do use the concept of penetration rate for fuel switching; correct?

A. We use the concept of penetration rates to look at the take-up of programs. We use the

concept of market share when we look at the share of fuels in markets driven by market forces.

I don't particularly use the concept of penetration rate as something that is the result of market forces acting to make choices, to -- as a result of choices made in response to market forces. That would be clear.

Q. You make estimates in your end-use forecast of the extent to which a particular decision like switching fuels will penetrate the marketplace; correct?

A. Yes. I call it a market share.

Q. Market share, okay. And what is that percentage for fuel switching in your current estimates over the same time frame that we are talking about NUGs?

A. I have market shares for the residential and commercial space heating market. I could look them up, but they are of the order of 20, 25 per cent. It is a very different market.

Q. It is true, isn't it, that the influences on fuel switching are at least by analogy similar to the influences on self-generation; correct?

A. Only directionally. The difference, or the major difference is that you actually have to

generate electricity with natural gas, which has a major efficiency loss in conversion; whereas, the markets that we are looking at, the space heating markets, we are talking direct combustion of gas to produce heat in comparison to the use of electricity to produce heat. There is a major difference in the efficiency losses if you are talking about secondary energy.

Q. High efficiency cogeneration is what sort of efficiency level, on average? Let's say we are talking 5,000 heat rate. What sort of efficiency?

A. All right. You are going back and forth between load displacement NUGs and various forms of cogeneration.

Q. Isn't that what they are?

[9:45 a.m.]

A. Not always.

Q. The projects that are being proposed right now to self-generate, in almost every case they are cogeneration, aren't they, Mr. Burke?

A. There's a certain component of cogeneration in the project; yes. I don't know the specifics of these projects because no one is running around telling everybody what the specifics are, so I don't know what degree of cogeneration is in these

projects.

Q. Is there a major difference in efficiency between a gas furnace in a home and a high-efficiency cogeneration facility in a hospital or an industrial plant?

MR. SNELSON: A. I think there's a range of efficiencies in both cases. My gas furnace in my home is well over 90 per cent efficiency. Cogeneration efficiencies aren't typically that high.

Q. Although, in fact, in all of your material the assumption you use for gas efficiency is 75 per cent; isn't it?

MR. BURKE: A. Well, which material?

Q. Well, it's right here. Throughout here we see all these efficiency adjusted figures. Those are your figures; right?

A. Yes.

Q. Okay. And that you use 75 per cent efficiency for that?

A. I'm not exactly sure. I thought it was even lower than that frankly, but they're just intended to be indicative. We have the unadjusted numbers, and we show some adjusted numbers. We give all of the efficiencies that are possible in the document.

Q. We were looking at Exhibit 798 in chart 4, and I'd like you to just look at the first two lines of that, which are -- this is Energy Consumption for 1991, apparently.

And the first line is electricity measured in kilowatthours and the next line is natural gas measured in cubic metres. And I am just going to ask you, there's a number at the end of each of those lines which is cost per gigajoule. Is it fair to say that that's the relative cost per unit energy expressed in constant terms of those two fuels? Is that what that concept is?

A. I'd have to look carefully to see -- sorry.

I'd have to look carefully to see how they have calculated the ratio. There are many ways of doing that. I'm not sure, for instance, offhand whether they're using the equivalent energy... No?

Well, if you want a comment on that you're going to have to give me time to look at this table.

Q. The ratio of gross energy output -- or sorry, I have to be careful here. The cost per unit energy for electricity is, in your own evidence, substantially higher than the cost per unit energy for

natural gas, correct, for most uses?

A. In input terms, yes. The question is which is the more efficient in output terms, and that's what it comes to in the end; in other words, electricity is a higher quality energy form and, therefore, may provide more service per input Btu than natural gas, but it can be that the costs of that may not outweigh the benefits.

Looking at the numbers here, the unit cost, the ratio of the unit cost of electricity and gas seem to be roughly the same as the cost per gigajoule at the end of the -- of the column, so I think what the cost per gigajoule is reflecting for the most part is simply the ratio of the unit costs.

Q. Sorry. Could you explain that? Maybe I just can't read very well today. It doesn't look like the ratio of unit cost is anything like the ratio of cost per gigajoule, but --

A. All right. Sorry, I take it back. I will have to study this table more to draw any conclusions from it. You're right. It's a coincidence.

Q. All right. Let's get out of this.

I'm going to ask you to look at page 2 of Exhibit 938. If you recall, we talked about that,

being a chart of your figures from Attachment E or Attachment C, rather.

Do you have that, Mr. Burke?

A. Yes.

Q. Now, if you can just hold that there and go to Attachment E, page 51, and you see there's a list of projected real industrial electricity prices, right?

A. Yes.

Q. Now, I guess having seen this ski slope here of natural NUGs, I would have expected that if we plotted the shape of electricity prices, we'd get a similar shape, but if you look at page 3 of Exhibit 938, you see the shape is quite different.

Now, this is, as I understand it, because you project natural NUGs as a function of a combination of natural gas prices and electricity prices, correct?

A. Yes.

Q. So even though electricity prices go up and stay up, people will drop their production of self-generation because natural gas prices are going up?

A. That's what the equation suggests; yes.

Q. Well, that's what your projection

says, right?

A. Yes. That part of the projection is based on the equation.

Q. Okay. Once the customer has paid for the capital cost of a self-generation facility, they only have the fuel and the OM&A costs left, right?

A. Yes.

Q. That means that their cost of production of electricity from that facility is cheaper than before they built it; right? You have got some --

A. Yes. There's the -- once the capital cost is sunk, it -- it's not part of the ongoing cost of the facility.

Q. And, in fact, generally isn't it true that in order to amortize capital costs on that per unit basis, typically with any capital decision, you want to have as many units of production as possibe to reduce the cost per unit; correct?

A. Yes.

Q. So wouldn't it be true in the case of a cogeneration facility that once it's built, in general the owner of it would want to produce as much as possible from it?

A. As long as his operating costs were below the cost he could buy an alternative source of

energy for.

Q. Absolutely. But if the self-generator has done an economic analysis and determined that with capital costs it's cheaper to self-generate than to buy electricity from you, isn't it true that once you take the capital costs out, you would have to have an awful big jump in natural gas to change that?

A. It depends what the expectations were in that study in the first place.

Q. Okay. Well, then, let's go to the model. I'm looking at page 104 of Attachment C. Well, I'm not yet, but I'm going to in a second.

And what you -- you call this model that you're using for this estimate a rational expectations model; correct?

A. A simple one, yes.

Q. And as I understand this, correct me if I am wrong, this model says the customers will self-generate based on their expectations of future prices, and those expectations will be rational in that they will be based on past price increases; is that correct?

A. What we are suggesting is that in order to proxy what people may feel are the future

prices of electricity and gas, we will look at recent past trends in prices and extrapolate those, not take into account any other future cost factors.

Now, whether that's strictly speaking rational from a, sort of the normal use of the word, that's for someone to judge. The use of the term "rational expectations model" is, to use the words together, rational expectations, it's what people can expect given the recent past. That's how economists use the term "rational expectations model", it's based on past information and a naive extrapolation of that into the future.

Q. I thought you were making a causal connection between past price increases and customers' decisions to self-generate. No causal connection?

A. We're making a causal connection between what -- it's not even a causal connection. We are inferring what customers will think future prices of electricity and gas are from the recent trends, rather than from what anyone else may say about the future price of those. In other words, we have a price forecast for gas that's rising after a year or two in the forecast period, but the recent trend has been that it's falling, so we're saying in the context of rational expectations modelling, the customer has every

reason to believe that gas prices will continue to fall. Electricity prices have been increasing, so people have perhaps every reason to expect, if they're extrapolating from the actual information they have, that electricity prices will continue to increase.

Now, neither of these in the long term is part of our forecast, but we're not expecting that customers will necessarily believe our forecast or act on it, we will expect them to have their own views. And when we try to come up with what those views may be, we have gone to this approach of rational expectations modelling which tries to find what they would think without us knowing what goes into their calculations just based on the trends in recent history.

Q. So you're talking about recent trends, but isn't it true that your model only looks at the increase from last year to this year in each price?

A. The model uses an expected price variable which comes out of an electricity price equation and an actual gas price equation.

Q. Yes.

A. And those equations are, I believe, auto-regressive, which means they are the weighted average of very -- several recent years' prices.

Q. Okay. I guess I don't -- is the equation not here anywhere?

A. It's quite possible it isn't. We intend to document the methodology used here in a report which is not available yet. It will include the equations used for price expectations for electricity and natural gas and how we came to those as opposed to some other.

Q. So all these equations in here that appear to be explanations of what you do and all use one-year price changes, that's not how you do it actually, right?

A. No -- sorry. No. Excuse me. We do give you equations here.

Q. Okay.

A. But the nature of these equations is that the... Yes. The coefficient estimate on the lag values is a functioun of many years' price changes. When we are forecasting, that relationship just is applied to the last year. I guess that's the distinction that I would make.

Q. I didn't understand any of that. Let's try again.

A. Well, I think you're trying to suggest that -- that -- well, I'm not sure what you're

trying for suggest. Maybe you had better try again.

(Laughter)

[10:00 a.m.]

Q. I'm not sure I'm sure any more. Okay. The equation is here. Which one is it?

A. Well, they are the price expectation equations that are given about two-thirds of the way down page 105.

Q. PELEC and PNGAS; right?

A. Yes.

Q. And each of those uses a one-year change variable; correct?

A. Yes.

Q. But then you are saying that the coefficient - that is, the number before the variable - has been established based on...what?

A. Well, it has a whole time series of values for the relationship between electricity and previous prices and the lag price.

Effectively, what I am saying is there is more than a single-period wait in the estimation. But when you forecast, yes, you are quite right, you apply that coefficient times the last value to get the next value. So it is very simple in that sense, yes.

It just says -- but determining whether

it is 1.1 or 1.3 that was -- in the estimation process has effectively looked at how prices compound over time.

I don't think it is material to anything. For forecasting purposes, you are right, we are using the last value and multiplying it by a coefficient here. I just was reacting to something you said about we are only using one data point. We are not.

Q. No, I didn't say you are using one data point. I said in your future projections the relationship of self-generation is to last year's price change only. That's correct, isn't it?

A. Yes, that's correct. Yes.

Q. And all the stuff about the coefficient adjusting for it, that is not correct, is it? The coefficient does not adjust for that relationship, does it?

A. Well, now, you have lost me. I don't know which relationship any more.

Q. The relationship between the change in prices in one year and self-generation the next year, that is the relationship you have postulated in this equation; correct?

A. The equation we are looking at now is a relationship between past electricity prices and

current electricity prices.

Q. Correct. And then in your formula what you say is --

A. -- on page 106 now?

Q. Okay. Your formula says direct relationship between that and self-generation; correct?

A. That's correct, yes.

Q. So then there is a direct relationship between the first part - that is, your change in prices from one year to the next - and self-generation; correct?

A. Yes. Sorry, if that was -- I must have gone off track there, if that was all you were looking for.

Q. So from the point of view of this equation, if you show three years of dropping electricity prices and then a year of increasing electricity prices your equation will assume more self-generation, notwithstanding that the trend is generally down rather than up.

A. The equation operates as you described it, and it represents the best analysis we could come up with. We don't find significant relationships between the prices two or three years ago, so we didn't use them. I can only say that is

what this equation shows.

If you don't like the equation, that's fine. But that is the way it works. You have described that correctly. It is empirically the best equation we could find.

Q. And if Ontario Hydro announces, for example in this hearing or at the OEB or wherever, press release, that prices over the next three or four years are going to go up "X" per cent real, whatever it happens to be, this equation will not suggest that that will have any influence on self-generation, correct, because in fact it is not in there anywhere?

A. That's right. It is looking at -- it is saying that people are determining their views on the basis of the past.

Now, the reason we did that was because our forecasts are not in the same direction as the past, and we would get much less load displacement non-utility generation if we were to forecast this using our prices as opposed to expected prices.

We certainly aren't going to let the thing whipsaw and go the other way and get a perverse result out of this equation. The intent of this equation is to get a higher result for load displacement NUGs than we would get if people used our

prices as if they were theirs, their forecasts.

Q. All right. Let's move to a second area on this.

Below a certain threshold, let's say a threshold of combined electricity and natural gas prices unfavourable to self-generation, there is a certain point at which it simply isn't economic for anybody; isn't that right?

A. Well, yes. There is a certain point, and you also have to include on that spectrum the degree of cogeneration that is involved in the facility.

Q. Of course. Of course. But there is a threshold there somewhere, a threshold price, and you just can't cover your capital costs unless you have a certain price advantage of electricity over -- or of natural gas over electricity; right?

A. Yes.

Q. Okay. There is no threshold in this equation, is there?

A. No.

Q. You based this equation on data from 1972 to 1992; correct?

A. I believe that's correct, yes.

Q. In which you looked at electricity

and natural gas prices and then fitted your function to actual self-generation during that period?

A. As estimated by Statistics Canada.

Q. Isn't it true that for much of that period the relative price of natural gas and electricity coupled with the capital cost of equipment made self-generation rarely viable; isn't that correct?

A. In the early '70s it was quite attractive. I can only say that load displacement non-utility generation facilities have been put in service throughout the period since 1972, not just in the early '70s. There was major facilities in the early '80s put in place.

Q. Will you take a look at page 20 of the load forecast, please? Do you have that?

A. Yes.

Q. Do you see the chart at the top of the page? If you ignore the fuel oil figure, which is the middle line, isn't it correct that the relationship between electricity prices and natural gas prices is quite different in your forecast period than in the last 20 years? Isn't that a fair conclusion?

A. Historically, we had a period of falling ratio between electricity to gas; that is, gas became more expensive.

You can see the gas line peaking at '83 there, and then falling against a relatively flat electricity line, and in the future we have a period in which we project that gas will rise relative to electricity.

There is certainly precedent historically, and, in fact, that is why the equation fits fairly well, is that in the period beyond '83 when -- sorry, in the period around '83 when gas prices were rising and electricity was fairly flat, production from the facilities actually declined according to Statistics Canada data and has subsequently picked up, so that there is some tracking of the price of -- the relative price movements. Otherwise, you wouldn't get a good equation.

Q. I look at that chart, Mr. Burke, and it looks to me like -- it is almost like the line you drew in the middle of the page distinguishing between one period in which the prices weren't very far apart, little bit but not too much, and your projected period in which they are and continue to be throughout the period quite aways apart; isn't that a fair --

A. You are looking at absolute differences now as opposed to trends, slopes?

Q. Isn't absolute differences how

self-generators pay for their capital costs?

A. Absolute differences...? No, I -- relative price differences. The ratio of prices are at least as important as the absolute difference.

MR. SNELSON: A. I think there is a caution you should perhaps bear in mind in looking at this figure, and that is that -- particularly when you start talking about absolute differences rather than just general trends, and that is, this is for the residential sector and what Mr. Burke's been talking about is primarily for the industrial sector.

And there are availabilities of different types of gas supply that aren't available to the residential customer through contracting arrangements and so on, and there are different proportions of distribution costs for both gas and electricity rolled into this. So I would think one would have to be a bit cautious about how far one went in judgments in respect particularly to absolute differentials rather than trends in this figure.

Q. We don't have a chart like this for industrial, do we, in any of your material?

MR. BURKE: A. I'll check Exhibit E. I wouldn't be surprised if there is one in Exhibit E.

Q. I looked for one, and I couldn't find

one, but maybe it was late at night. Maybe you could let us know later if you find one?

You mentioned the period of the early 80s. Now, Mr. Burke, it is correct, isn't it, that during the period of the early '80s the cost of gas reached the point where the marginal fuel cost actually exceeded the cost of electricity; isn't that right? Once transportation and everything else was taken into account, it was actually more expensive than simply buying it from Hydro?

A. I really am not sure what you are referring to here. All the plots and stuff that we have got here show gas price below the price of electricity.

If you are asking what it would cost to cogenerate with that gas or generate from natural gas -- and certainly there were periods where you could not cover with most operating efficiencies the price of electricity using gas as a fuel for generation. I'm not quite sure what you are trying to get at.

Q. That's okay. No, that is exactly right.

Now, in the period of your forecast there is no period of time in which you expect that condition to occur, is there?

A. I think that it gets close, but it is certainly not like the period of the early '80s.

Q. The only period of time in your historical data, the data set on which you fitted this equation in which self-generation declined, was in that period that you have just described; right?

A. Except for the recession in '75. But yes.

Q. And you don't expect conditions like that to take place again. Isn't that what you have just said?

This sounds very obtuse, I know, but I guess, I don't understand how you can expect self-generation to decline unless the same thing happens; that is, it becomes marginally more expensive to use the gas than to use the electricity. And you are not projecting that, so how can it decline?

A. Well, if we got into an engineering analysis of cogeneration, then I think the principles that you are talking about have some validity.

I used this equation because it captured the relative price changes and how they affected demand historically. And I agree, there is some uncertainty whether in future people will in fact, at the price levels that we are looking at, use less electricity

than -- generate less electricity with their facilities than at the maximum point in 1998.

It is not necessarily the new facilities that are going to -- you know, the equation does not imply that it is the new facilities that are being installed that will reduce their capacity. It could be -- reduce their generation -- it could be older natural gas load displacement NUG facilities that are less efficient, that wind down their generation.

I can't be site-specific or engineering-specific with this equation. There are circumstances in which the results of the equation could hold.

I would not have been able to fit an equation -- I could not ever have had an equation which told me the response at price levels which we have not had. So that is a bit of a conundrum. This was the best equation that we could find.

There are circumstances one could postulate where it would be attractive to customers to buy from Hydro, perhaps in off-peak periods, but -- sorry, yes, in peak -- well, whichever, in off-peak periods and not in peak periods, various ways that people might respond to shifting relative prices which might make their situation advantageous.

I am simply -- for something which I think we would all agree is rather difficult to project, we have come up with what we believe to be a plausible equation. There is a degree of uncertainty certainly.

What we are talking about is three terawatthours in the year 2015, and I will admit, there is a degree of uncertainty how people will respond when prices get into that range.

The sort of price ratio we do have in the industrial sector by 2015 is about 3.2 or 3.3 to 1 for electricity to gas. And if there was no cogeneration involved in the facility, it would not be economic to run those plants. But it depends to what degree there is cogeneration involved in these facilities and are there some amongst the 10 terawatthours who have relatively little cogeneration benefit out of their facility. It's -- we're on the margin, and I agree, it's uncertain.

[10:20 a.m.]

Q. It's reasonable to anticipate that the certainties surrounding this projection could be hundreds, perhaps even thousands, of megawatts; is that conceivable?

A. Thousands I don't believe to be

conceivable, no. In the sense of the sort of ground rules that this equation purports to project into where -- I'm not trying to deal with a totally different universe here, but when you look at the sites that offer cogeneration possibilities and their economics and so on, none of the numbers I have been told get into thousands of megawatts. There are hundreds. Well, we've got 300 here, and, yes, there could be more load displacement non-utility generation.

But, again, as I understand it, the economics of the incremental facilities largely depend on where the direction of future prices actually go or where people they think they will go, not on current prices, or we perhaps would have seen more cogeneration -- more of these facilities already.

Q. The third concern about your equation is one that you've alluded to yourself, that is, that it deals only with industrial self-generation. I understand that industrial self-generation is slightly different in this context. That's fine. But it's true, isn't it, that with increases in electricity prices for your commercial customers, and even some of your residential customers, it's now approaching the point where it is economic for them to self-generate; isn't that correct?

A. I'm really not aware of that. I wouldn't be able to speculate. I think what I said was that in -- there are many commercial facilities that have properties similar to industrial plants, and I have an understanding of the options there, but if you're talking about individual households and so on, I'm not aware of the economics of generating power being attractive at that small a scale.

Q. Office buildings?

A. I really wouldn't wish to get into exactly at what point the plants become cost effective, what size.

Q. Well, if you're going to estimate self-generation, you sort of have to know that, don't you?

A. Yes. I've relied on the advice of the experts and the non-utility generation people in the Non-Utility Generation division, and they have not been suggesting that I include that sort of number in my projection.

Q. So with the exception of a small amount of hospitals and universities, your current projection is that the amount of self-generation in the commercial and residential sectors for the next 25 years will be zero; is that correct? That's what your

projection says.

A. That's what the projection says; yes.

Q. I know I'm mixing apples and oranges here, but isn't the City of Toronto project currently proposed to do district heating and local generation? Isn't that commercial sector? I mean, if it were a private sector person doing it, it would be in the commercial sector, right, it's office buildings?

A. Yes. I think that -- yes, that's a district heating scheme.

Q. Okay.

A. That's more than a building. That is a series of buildings, it is akin to a university in scope or probably larger.

Q. Okay. But what you have in your forecast for that is zero, right? You don't have it in the MUGs category and you don't have it in the NUGs category, do you?

A. That's correct.

Q. In 1990, natural thermal NUGs reduced annual energy by about 4-1/2 per cent, is that about right, just from the -- 4-1/2 per cent of total basic load. Am I in the right range there?

A. I'm just checking the numbers here.

I've got about 6-1/2 terawatthours out of

the 140 on the system; yes.

Q. Okay. And you're expecting that category to increase to about 6 per cent of basic load by its peak, right, by 1998, that sort of range?

A. Yes.

Q. And you're also projecting that by 2015 that will have dropped to about 2.8 per cent of basic load, correct?

A. That's what's in the projection, yes.

Q. So relatively speaking, that less self-generation than today by a substantial margin notwithstanding higher real electricity prices and a bigger difference between electricity and gas prices; is that correct?

A. The ratio of electricity to gas prices will be -- is projected to be lower beyond about the year 2000 than it is today.

Q. Dollar difference is bigger, though?

A. The dollar difference may be bigger; yes.

Q. Okay.

A. But the ratio is smaller.

Q. You will, I know, be disappointed with this, but I want to leave the load forecast and go to Attachment D, which is system incremental cost. So

whose turn is it?

Is this you, Mr. Snelson?

MR. SNELSON: A. You can start with me. I may have to defer some questions to other panel members.

Q. Fine. Okay. Attachment D of Exhibit 796, that's your latest set of system incremental costs, Mr. Snelson?

A. Yes.

Q. If you go to the first page of that, under the second heading Scope, it says that this includes capital changes up to October 19th. Now, I presume that, therefore, these system incremental costs do not include the closure of Lakeview, termination of the Manitoba deal, or any of the other changes since October 19th; is that correct?

A. It doesn't include changes since October the 19th. Closure of two units at Lakeview would have been, but the other two units would not.

Q. And this assumes Manitoba's in?

A. Yes. I believe... I believe it assumes Manitoba is deferred by five years.

Q. If you would go to page 12 of the report, please. Rather than just traipse through the report, I just want to look at the genesis of some of

the information on which this report has been prepared. This list here under 8.0, Data Source and Assumptions, this is a list of where you got the data and what it's currency is, right?

A. Yes.

Q. And so, for example, it's based on the 1991 load forecast, correct?

A. It lists the load forecasts. It depends upon which includes a September '92 update to the short-term load forecast.

Q. Okay. But it doesn't include the new load forecast that we've just been discussing at lenth with Mr. Burke, does it?

A. It does not include the December '92 load forecast; no, sir.

Q. I'm just looking for a reference here. Just give me a sec.

Okay. Will you turn to the previous page, page 11, and under No. A it says:

> Values in this prediction are sensitive to variations in assumptions pertaining to forecasted load growth and should not be used for analysis where load growth is significantly different from those used in the preparation of this prediction.

So I assume, therefore, that given the fact that you have a new, and by your own evidence, a quite different load forecast, doesn't that mean that you shouldn't be using these SICs any more?

A. No, I don't believe so.

Q. Okay. And why is that?

A. The changes in the load forecast in the long run are not as large, are not all that large; and you've had the evidence on that from Mr. Burke. And in addition, the issue of this set of system incremental values was delayed until the magnitude of the likely change in the December '92 load forecast was known, and the people who prepare this considered it close enough to issue it for use in the organization.

Q. Okay. The next item here is Corporate Financial Discount Rate. Now, that hasn't been updated since this September, right? It's the same number that you're using now?

Still on page 12 here in this list of assumptions.

A. I see the assumption; yes. And what was your question? I'm sorry.

Q. The question is: This says September '92, that hasn't changed since then, has it?

A. We're not aware of a change.

Q. Just looking at your capital expenditures here under the heading Thermal Integration and under the heading Power System Planning, now, the data from those, of course, has been substantially revised since those various documents that are listed there; is that correct?

A. We're looking at the Power System Planning category?

Q. I'm looking at the two categories, Thermal Integration and Services which appears to have all the fossil stuff in it and Power System Planning, which appears to have all the nuclear stuff in it.

A. Yes.

Q. And, I guess -- feel free to correct me if I am wrong, but it appears that you're using a report from earlier this year for nuclear and a report from 1989, or two reports from 1989 for fossil; there have been some pretty considerable changes in those categories of data since then, haven't there?

A. Well, I believe that they will have been adjusted for normal changes in escalation rates in such data. As regards the underlying data, I don't know of significant change since Panels 8 and 9 gave their evidence here; and I believe these documents were the base for Panels 8 and 9 as well.

Q. Fine. There's a document listed here, Nuclear Option Review 1992. Do we know that in this hearing under another name?

MR. DALZIEL: A. I think in Panel 9 it may have been an attachment to an interrogatory, but there's a document that was called Preliminary Nuclear Option Review. I think it had "preliminary" in the title.

Q. And it's still preliminary, same document; is that right?

A. That's being referred to here?

Q. Yes.

A. I'm not sure.

Q. I wonder if you could -- if this document, Nuclear Option Review has not been filed in this hearing, I wonder if you could undertake to file it; and if it has been filed, could you just tell us what document it refers to?

We couldn't find that, a document with that name, but if it refers to another document, perhaps you could let us know.

A. We can do that.

THE CHAIRMAN: That will be Undertaking No. 940.4.

THE REGISTRAR: No. 4, yes.

---UNDERTAKING NO. 940.4: Ontario Hydro to undertake to file the document, Nuclear Option Review, and, if it has been filed, ascertain what document it refers to.

MR. SHEPHERD: Q. You also have a report here listed as -- this is under Power System Plannings again, Transmission Planning, and it says, Transmission Costs 1991/1992 updates. Is that -- is that some sort of report that we've seen here?

MR. SNELSON: A. These sources aren't necessarily reports. They're sources of information which may exist in a variety of forms.

Q. I understand. Is this one a report?

A. Not to our knowledge.

Q. Okay. Just going on a little farther down to this fifth last line, it says: Forecast of Committed Demand Management, October 1992. That is a report, right?

A. Again, we're not necessarily familiar with all the data sources; and, to our knowledge, we don't know of that being a report.

Q. Well, Mr. Shalaby, you're in charge of that section, aren't you? You're in charge of that area of the utility?

MR. SHALABY: A. In the Planning Department, yes.

Q. Okay. Are you familiar with that report, Forecast of Committed Demand Management, October 1992?

A. No.

Q. You've never heard of it?

A. Not that it's a report, no, I haven't.

Q. Okay. We don't have in this package a Forecast of Committed Demand Management, do we?

A. What is the question again? I'm sorry.

Q. We don't have in this package, Exhibit 796 and friends, a Forecast of Committed Demand Management, do we?

A. The table opposite has the complement to that which is the Uncommitted Demand Management, which is what matters for the calculation of incremental costs.

Q. Okay. But that's not what I'm asking.

A. The answer to what you're asking is yes.

Q. Yes, we do have it, or, yes, we don't have it?

A. Yes, we don't have it.

Q. Okay. Can you provide it then?

A. Yes.

Q. Your Forecast of Committed Demand Management?

A. Sure.

Q. Thank you.

THE CHAIRMAN: That will be Undertaking No. 5.

THE REGISTRAR: 5.

---UNDERTAKING NO. 940.5: Ontario Hydro undertakes to provide the report, Forecast of Committed Demand Management, October 1992.

MR. SHEPHERD: Q. All right. You also have here under non-utility generation in-service and committed projects. Now, I take it that is the same as Attachment F in Exhibit 796; is that correct?

[10:40 a.m.]

MR. SHALABY: A. I would expect so, but as I say, I haven't examined all the data sources for this.

MR. SHEPHERD: Mr. Chairman, I am getting into a new area that might take a few minutes, I wonder if this would be an appropriate time to break?

THE CHAIRMAN: We will break now for 15 minutes.

THE REGISTRAR: Please come to order.

This hearing will recess for 15 minutes.

---Recess at 10:41 a.m.

---On resuming at 11:00 a.m.

THE CHAIRMAN: Please be seated.

Mr. Shepherd?

MR. SHEPHERD: Thank you, Mr. Chairman.

Q. Mr. Snelson, we were talking about exhibit -- sorry, Attachment D of Exhibit 796. And on page 12 there is a chart of uncommitted demand management and NUGs. And you use that uncommitted total to calculate project appraisal avoided costs; right?

MR. SNELSON: A. The uncommitted demand management and NUGs and hydraulic capacity is the difference between the two cases that are used to estimate project appraisal system incremental costs.

Q. So the answer to my question is "yes"?

A. That is part of the difference between the two cases, yes. The hydraulic is additional.

Q. Can you confirm that relatively small changes to these numbers, changes in the order of 50 or 100 magawatts could have substantial impacts on project appraisal avoided costs?

A. No.

Q. That's not the case?

A. System incremental costs are used for values up to a few hundred megawatts, and there would be some sensitivity, of course, but I don't believe it would be large for the order of 50 megawatts.

Q. It's true, isn't it, that the smaller you're uncommitted component, generally speaking, the lower the project appraisal avoided costs; is that generally true?

A. It depends which side of the equation is being kept constant.

Q. I don't understand your answer. Try again.

A. Well, is this a smaller uncommitted demand management being taken off the same basic load forecast or is it a smaller uncommitted demand management which is additional to the primary load forcast? And I think we get different answers according to which of those you assume.

Q. Completely lost. Let's try this again.

We've been through in Panel 3 at great length how you calculate project appraisal avoided costs. You do a plan with and without this uncommitted

component; right?

A. Yes.

Q. And you average the two costs?

A. Yes.

Q. Okay. And if the uncommitted component, that difference between those two plans you model - right? - is lower, is it not generally true that your project appraisal avoided costs are lower?

A. The project appraisal costs will be closer to the planning avoided costs, and if the data for the planning avoided costs has been kept constant, then the project avoided costs will be lower.

Q. Thank you. I'm just looking at this table on page 12 and it has a total of 2,029 megawatts of committed demand management and NUGs at present; right? Or, sorry, 1995, I guess.

A. Yes. If we're going to discuss this table, I would like to point out an inconsistency between this table and the paragraph that precedes it.

Q. Good.

A. In that the paragraph precedes it indicates that these values should be used for up to the amounts of demand management in the December '92 long-term load forecast.

Q. Yes?

A. But it also implies that the figures that should be used for "up to" are in the table.

Q. Sorry, up to what?

A. Well, you see, if you read the first sentence, it says: Incremental system values for project appraisal are applicable for the assessment of uncommited amounts of demand and supply side options as summarized below.

And as I read that, the "summarized below" is the table.

Q. Yes.

A. And it then later says that:

In the case of demand managements, it should be used for amounts over and above those included in the December '92 load forecast.

Q. Yes.

A. And those two statements are inconsistent.

Q. And which is right?

A. The intention is that these system incremental costs should be used for up to the amounts of demand management included in the December '92 long-term load forecast.

Q. So it's not amounts over and above those in that forecast, it's amounts up to the amounts in those forecasts?

A. Well, it says: Incremental system values for planning are appropriate for amounts over and above those included in the December '92 load forecast--

Q. Oh I see. That's right.

A. --and by implication project appraisal values are for use up to those values.

Q. So the first two lines, then, we just ignore? They're wrong?

A. They are incorrect.

Q. Great. Glad we got that cleared up.

The 2,029 committed megawatts, that's what you have committed today; right?

It's the same throughout the chart, so I assume you have it now.

A. It's committed as of decisions that have been made at this time, yes.

Q. Okay. So can you break that down between DSM and NUGs for us?

A. I think that's essentially the undertaking that Mr. Shalaby gave you. You asked for uncommitted non-utility -- sorry, committed demand

management, and I believe Mr. Shalaby gave you that undertaking.

Q. Okay. So you don't know the NUG committed number?

A. I have indicated that to my -- as far as I know, it is close to the values that are in attachment F.

THE CHAIRMAN: Just so I'm clear, would the total committed megawatts include committed demand management committed NUGs, does it also include hydraulic or not?

MR. SNELSON: It should do. I'm not sure whether there is anything in there to actually include.

THE CHAIRMAN: Right.

MR. SHEPHERD: Q. You shouldn't have any committed hydraulic; right? Logically?

MR. SNELSON: A. We shouldn't have any committed hydraulic?

Q. Since you're asking for approval for your hydraulic here, presumably you don't have any committed yet.

A. Well, there may be some hydraulic improvements that are committed that are outside of what we're looking at. For instance, Big Chute.

Q. Hmmm. Okay. The committed NUGs, I

just want --

THE CHAIRMAN: Well, except for that, you could take the table F and the 2,029 and from that derive substantially what the committed demand management was?

MR. SNELSON: You should be able to do that, yes.

MR. SHEPHERD: Q. So in table F, then, you have this in service and committed, and that looks like it totals about 800 megawatts, give or take; so I assume that the rest of this committed megawatts is demand management or hydraulic; right?

MR. SNELSON: A. Yes.

Q. Good. Now, I guess what I don't understand is you got, to the year 2000, 227 megawatts of uncommitted NUGs; right?

A. See, I have just realized something which may, in fact, make this arithmatic we're going through inappropriate. And that is with respect to the -- assuming that we can deal only with purchase non-utility generation, and I would expect program-driven load displacement nonutility generation to be additional to that.

Q. That's fine. That's all you wanted to clarify? That's fine.

A. Well, that is the, you know, I haven't been through precisely this way of working things through, and it appears as though it should work with that qualifier.

Q. The program-driven load displacement is what, 71 megawatts or something like that?

MR. BURKE: A. That sounds right.

Q. So if we were within 71 megawatts we should be happy here; right?

MR. SNELSON: A. Yes.

Q. So we have about 800 megawatts of committed in this chart on page 12, and we have 227 megawatts of uncommitted, which is 1,027 megawatts totalled to the year 2000.

Now, I guess I don't understand how that relates to 2,384 megawatts. That's a lot bigger difference than 71 megawatts; isn't it?

A. Yes, it is a larger difference and I don't know the reason why.

Q. Could you find that out for me?

A. Yes. We'll endeavor to do so.

THE CHAIRMAN: Is that undertaking number...?

THE REGISTRAR: Point six.

THE CHAIRMAN: Thank you.

---UNDERTAKING NO. 940.6: Ontario Hydro undertakes to determine why, with 800 megawatts of committed and 227 megawatts of uncommitted which is 1,027 megawatts totalled to the year 2000 how that relates to 2,384 megawatts - being a greater difference than 71 megawatts.

MR. SHEPHERD: Q. Now, we talked about the sensitivity of project appraisal avoided costs to variations in the uncommitted assumptions. If you're really out 1300 megawatts, is it sensitive to that sort of range?

I asked: Is it sensitive to small changes like 50 or 100 megawatts? And you said: No, not really.

What about big changes like 1300 megawatts; is it sensitive to that?

A. Potentially it's sensitive to that, yes.

Q. Great.

Now, can you go back to page 2 of Attachment D, please?

And as you'll see in the third paragraph there, Mr. Snelson, it says:

> You no longer - I think it's right - you no longer give interarea transmission credits for NUG projects or DSM programs

unless they provide capacity in the Toronto area.

Is that basically correct?

A. Yes.

Q. So that would reduce the avoided costs for most NUG projects and most DSM programs, wouldn't it?

A. Due to that factor alone, yes.

Q. Of course that methodological change was before you had cancelled the Manitoba contract; right?

A. It was about the same time.

Q. Well, my question is one of chronology. Does this methodological change take into account the cancellation of the Manitoba transmission or does it not?

A. I have said that the data for these system incremental costs is based on an assumption of a five-year delay to the Manitoba Purchase contract.

Q. Great. So all that transmission not being built in Northern Ontario, when you have that situation, is it fair to assume that demand management and NUGs, new generation, new load reductions, could now once again have a significant effect on transmission requirements in Northern Ontario, now that

you're not going to have that big line any more?

A. The big line we're talking about is the Manitoba interconnection --

Q. Yes.

A. There will be some adjustments to the impacts of demand management and NUGs on the transmission plan, yes.

Q. But what I'm getting at here is that when you told us in Panel 7 that there would be significant transmission needs if you didn't build Manitoba -- you didn't build the Manitoba transmission. And, in fact, you said those needs were so big, it was almost like you were getting the transmission for free.

So presumanbly you now have to build --

THE CHAIRMAN: I don't know whether he actually said that. Did you say that, Mr. Snelson?

MR. SNELSON: Well, first of all, he was referring to Panel 7 and I wasn't on Panel 7.

THE CHAIRMAN: I thought you were on Panel 7. Am I wrong about that?

MR. SNELSON: Panel 7, I believe, was Manitoba and Transmission; and Mr. Huggins and Mr. Macedo were on that panel.

THE CHAIRMAN: You weren't on that panel?

MR. SNELSON: I was not on that --

MR. SHEPHERD: I thought he was, too.

(Laughter)

Q. I withdraw the "almost for free".

But without the contract, obviously you have those needs again, and demand management in NUGs could affect those needs, could delay them or adjust for them, right, and it would have value; isn't that correct?

MR. SNELSON: A. It can affect the needs for transmission. Whether that causes it to be a situation where demand management has value in the sense that it reduces them rather than having a cost in the sense that it increases them, now that's something that would have to be evaluated.

Q. All right. And so, in fact, your current policy then is that you give transmission credits if load is -- the load balance is improved in the GTA, but, other than that, you have to do an individual assessment of the actual transmission savings associated with the project; right?

A. It says on Panel 2 -- on page 2 of this attachment, that's attachment D:

> Options with impact on areas outside the greater Toronto area may be viewed on a project-by-project basis.

So the answer to your question, I believe, is yes.

Q. Good. Now, one of the effects of that is that the cumulative impact of a number of projects would never be caught in that analysis, would it?

If a project doesn't defer or affect a transmission requirement by itself, it will get no transmission credit; correct?

A. That would depend on how the individual project-by-project analyses were done.

It's quite possible to attribute a share of a change in a transmission plan to individual components, so as you don't avoid the situation of saying that up to some limit they have no effect and then the last small one has a very large effect. So there are ways of dealing with that.

Q. There are ways, I agree with you. But that's not how you do it, in fact, is it?

A. Well, I believe that this statement here is a direct consequence of the information that Mr. Macedo discussed on Panel 7, and that this is a step along the path that he indicated of trying to be more location specific in giving transmission credits.

Q. If you take a look further down page 2 of this report, you see under 3.1 a reference to the

fact that your credit capacity or work capacity is available at winter peak, and this is something we have discussed before and I don't intend to go through it again.

As I understood it from Panel 3, both you and Mr. Shalaby were on, I believe, Mr. Snelson?

A. Yes.

Q. And Panel 8, I got the impression that Hydro back then, that was a long time ago, was reviewing whether summer capacity should have some credit. Capacity available at summer peak should have some credit.

And I guess my question is: What is the status of that review of the policy? Has it changed? Is it still under review?

A. I don't know of any changes in that policy in the last few months.

Q. Mr. Shalaby, this is you in Panel 3, page 6909. If you wish to get it, feel free.

I can show you this copy of the transcript if you would like, if it's easier for you. Do you want to see that?

[11:23 a.m.]

It is the bottom of page 6909 where you say, Mr. Shalaby:

We are considering whether part of the incremental power cost should be ascribed to summer peak, and there are two reasons why we are looking at that. One is because of the fairly high air conditioning loads that we have experienced and the other is because of of the relatively large maintenance requirements that we have experienced.

While that is not forecast to be the situation over the long term in the future, it has been the actual experience over the last few years. So that causes us to have another look at it.

Mr. Snelson obviously is not familiar with it. Do you recall what has happened to this process that you have described here in Panel 3?

MR. SHALABY: A. I don't have a definitive knowledge of in what way the summer credits have shifted. I don't know that.

Q. Okay. Mr. Snelson, back to you.

Take a look at page 3 of this report, which has a discussion here of - I think it does - of the value of short-term capacity.

Do you see at the top here it says: The

retirement of two units at Lennox TGS, for example, is assumed to be the marginal action in the short term for planning purposes. That is the short term capacity number; right?

MR. SNELSON: A. Yes. And that statement is not strictly accurate. It should read: the mothballing of two units at Lennox.

Q. Mothballing is a lot cheaper than retiring, isn't it?

A. No, I think the distinction here is that -- it is the temporary removal from service rather than the permanent removal from service.

Q. The annual marginal cost of mothballing is substantially lower than the annual marginal cost of retiring a unit before it is due; isn't that correct?

A. I would not expect that to be the case.

Q. Okay. Anyway, we are still going to do something with Lennox; right? And I presumed that your system incremental costs were calculated using mothballing, not using retirement as the assumption.

A. That is why we made the correction.

Q. Okay. Good. So now I am going to ask you to look at Exhibit 592, which I think I asked

your counsel to have available to you on Thursday, and that is the March system incremental costs. And if you take a look at the bottom of page 2 of that one it says -- do you have it, Mr. Snelson?

A. Yes.

Q. Good. It says Lakeview TGS, for example, is assumed to be the marginal station in the short term for planning purposes.

Now, that is the short-term capacity number in the March SICs; right?

A. Yes.

Q. Good. It is true, isn't it, that that change in assumption is in fact the biggest single change in your SICs; isn't that correct? Has more impact than any other change?

A. I couldn't confirm that. I would have to go and make a lot of comparisons to confirm it.

Q. Well, we will see if we can get a sense. In March you were calculating avoided cost based on an assumed surplus; is that right?

A. The March values were based on a managed surplus case in what would otherwise have been a surplus situation, yes.

Q. There was still a surplus, right, same as you have now? I mean, a slightly different

size, but still a surplus?

A. The base for the planning values was a case where the surplus was managed.

Q. And in the November SICs, that is also true; correct?

A. The November SICs are based on the case where the surplus is managed to the degree to which the October board decisions would have managed the surplus. So it is not a completely managed case. There is still some replaning surplus.

Q. It is fairly similar. Is it a big change?

A. It is a change that -- you can review the October board memo, and you will see that there is still a surplus of the order of a thousand megawatts in quite a few years.

Q. Now, if we were to compare project appraisal avoided costs for March and November one of the factors that would skew that difference is the amount of uncommitted NUGs and DSM; right? That amount would have changed in that time, perhaps?

A. If that amount had changed then that would affect the difference, yes.

Q. But if we look at the planning numbers then we don't have any impact of the committed

component, right, or the uncommitted component?

A. I believe if we look at the planning values we have the full impact of the uncommitted values.

Q. Planning values are delta kilowatt and delta kilowatthour numbers?

A. Yes.

Q. So they don't have any of that uncommitted DSM and NUGs in there, do they?

A. They have all of it in there.

Q. Well, they have all of it as sunk; right?

A. They have all of it in the plan on which the values are based.

Q. The point is -- all right. Nevermind.

Take a look at Exhibit 592, the table of "Planning Values" at the end. It is the sixth last page, it looks like, "Planning Incremental System Values of Power". Date at the bottom is March 1, 1992. Do you have that, Mr. Snelson?

A. Yes, I do.

Q. Okay. And there is a column that says "Cost of Generation". This is the column to which that Lakeview-Lennox discussion we were having relates;

correct?

A. It certainly affects that column, yes.

Q. And you see that the annual cost per kilowatt in 1992 dollars is $31.60 for about the next 16 years. Do you see that?

A. Yes.

Q. Then it goes up as you add generation; right?

A. Yes.

Q. Okay. Now I would like you to turn to attachment D of Exhibit 796, and at the back there is a similar chart headed up "Planning", dated November 24, 1992. It says, "Incremental System Values of Power". Again, it is about the, I don't know, fifth or sixth last page in the package. Do you have that, Mr. Snelson?

A. Yes, I do.

Q. Now, with your new assumption of mothballing Lennox, the annual cost of generation - this is the value per kilowatt - is not $31.60 anymore; it is $3.97. Correct?

A. Yes.

Q. Okay. Will you confirm that there has in fact been about a 65 per cent drop in the net

present value of capacity from the March numbers to the November numbers? Can you confirm that that is the case? The net present value, your cost of generation line, you will find a 65 per cent drop?

A. Over what time period?

Q. The time period being estimated here.

A. Are we talking about a kilowatt of capacity coming into service in 1993 and lasting to 2027?

Q. Yes.

A. Clearly, there is a very large drop up until 2008 if we are talking about planning values--

Q. Yes.

A. --which is a function of surplus capacity and the assumption that you have referred to in respect to Lakeview; all right?

I haven't done the present value -- that is a drop that is more than your 65 per cent. I haven't done the calculation as to what is the weighted average over the full time period.

Q. So you don't know whether there has been a 65 per cent drop in the value of power?

A. No, sir, I don't.

Q. You said that the reason that there has been a substantial drop -- you agree that there has

been a substantial drop, yes?

A. There has been a very substantial drop, particularly during the period of capacity surplus, yes.

Q. And there are two reasons for that. One is your change of assumption from Lakeview to Lennox, and the other one is the fact that there is a surplus?

A. Yes.

Q. But then there is a --

A. Well, the change with respect to Lakeview -- and let me just consult.

We believe it is the Lakeview-to-Lennox comparison, but that should require -- may require changing.

Q. I guess the problem I had with this, and the reason why I am going into it, is, you know, generally speaking your practice is when you make a significant point, you talk about a significant change in methodology or assumptions, you make a point of flagging it for the reader so the reader understands this is what this is all about.

And you definitely refer to this point on page 3, again on page 11 you refer to it, but nowhere do you say cost of generation has dropped like a stone

because we changed this assumption. And I don't understand why you didn't flag that so it was clear.

A. Well, we are only looking at the cost of power, and in many, many cases the cost of energy is the largest factor. I wasn't involved in the writing of this document, but they have certainly addressed the fact that there has been a change in assumption. I can't go beyond that.

Q. Interestingly enough, the other methodological change that we know about, which is excluding the interarea transmission credits, and that doesn't have anywhere near the impact we are talking about for Lakeview to Lennox, does it? Much smaller impact, right?

A. I would say it is of the same order of magnitude.

Q. Mr. Snelson, look at Exhibit 592, that chart that we have just looked at, incremental system values of power--

A. Yes?

Q. --and then look at the same chart in 796 at the interarea transmission numbers.

A. Yes.

Q. Net present value of that chain of numbers is not even a small fraction of the cost of

generation change, is it?

A. Well, I'm just looking at the values, and I see the bulk transmission values being of the order of 13 to 15. I see interarea transmission values once a need -- once they are identified as being of the order of 12, and my comment was essentially based upon a -- 12 and 14 is 26, which is of the order of the difference between four and 32.

Q. Why are you adding in bulk transmission here? Is this a new policy we haven't been told about yet?

A. I apologize. I have misinterpreted it. It is only the changes with respect to the interarea transmission. And you are right, it is a small change.

Q. And because the first 16 years of that is zero, dropping out that value in the calculation on a net present value basis is going to be a very small number, isn't it?

A. It is a much smaller number, yes. I agree to it.

Q. But yet, when you changed your assumption about that on page 2 of your report you put it in bold type so we wouldn't miss it. Why wouldn't you do that with the bigger change of Lakeview to

Lennox?

A. Well, I guess this is a little bit of speculation as to what was in the minds of the authors of this document when they wrote it, but quite clearly the issue with respect to transmission is a change in how the numbers should be used by whoever is reading this document, and so it would be reasonable to bring that quite strongly to their attention as opposed to the reason behind why the numbers have changed, but they should still use them in the same way.

Q. Okay. One other question about this Lakeview change. I guess I am trying to figure out the order that this sort of thing goes in because it seems circular to me and maybe I am just misunderstanding it.

You have sort of a generation plan that has Lakeview as your swing station. You then do the capital program review and you use the old SICs to do that, which has Lakeview in. So those SICs assume that you are using Lakeview as the swing station; right?

A. Yes.

Q. And in your capital program review you calculate whether it is a good idea to close Lakeview, and using these numbers that assume it is open you decide it is good idea to close it. Isn't that what the capital program review said?

A. That was part of the analysis that led to the closing of it, yes.

Q. Okay. So then, having determined that Lakeview should be closed according to a model that assumes that Lakeview is open you then produce a new set of SICs in which Lakeview is out; is that right?

A. Yes.

Q. And if you were to do an analysis now of whether the decision to close Lakeview is cost effective on new information, that decision to close Lakeview would be assumed in your data; right?

A. There is a sense in which you can never be quite up to date in your assumptions in that -- in using this type of method, yes.

Q. And, of course, that is the reason why your internal procedures are that you use production simulations for this type of decision; right?

A. Production simulations is part of a more detailed way of doing this.

Q. And production simulations do not have that problem of circularity, do they?

A. If you calculate completely through on fully consistent scenarios that doesn't have that

problem.

Q. Great. Page 5 of the system incremental costs refer to the 10 per cent preference premium, and just -- perhaps could you update us.

There was a discussion earlier on - I don't remember what Panel it was, maybe Panel 3 - about whether this was calculated right, you know, whether it was based on the mean or the median and all that sort of stuff.

Have you corrected your calculation of that premium based on those discussions?

A. I'm sorry, I'm not sure what discussions you are referring to.

Q. Well, we discussed - I'm sure it was in Panel 3 - the question of whether this uncertainty band under which you base this calculation of a premium was correctly around a -- I don't remember whether it was -- should have been a mean and it was a median or it should have been a median and it was a mean, but your witnesses said, yes, we are doing it around the wrong base, but it doesn't make a big difference so don't worry about it.

Have you corrected your methodology, is what I am asking? That is all I am asking.

A. We still apply a 10 per cent

preference premium for the same things for which we applied the 10 per cent preference premium before.

Q. And the calculation of that preference premium as related to your avoided cost bandwidth, has that calculation changed?

A. Well, the preference premium was not 100 per cent based on a calculation. There was a calculation which you are referring to which was used as one part of the -- the supporting judgment for a 10 per cent preference premium, and I don't believe that that calculation has been redone.

[11:43 a.m.].

Q. It's not been changed. Okay. If you take a look at page nine of the System Incremental Costs, this...no, I've already dealt with that. That's all right. That's the same set of questions in two parts of my list here. I think my word processor just threw it in.

Page 11 says under -- we've talked about limitation No. A., which is big change in load growth, don't use these numbers. Limitation B is don't use these numbers for more than 50 megawatts in changes; but, in fact, for all of your capital program review, that's what you did, right?

A. B says if the difference is to be

evaluated to more than 50 megawatts, consult the Power Source Integration Department.

Q. I'm sorry. You're absolutely correct.

So you did that. They said, go head, it doesn't matter what the number is.

A. They were involved in the calculations and application of it to the capital program.

Q. Okay. Will you take a look at the charts attached to this exhibit; and what I'd like you to do is look at the incremental system values of energy. Maybe just look at the project appraisal. And it's probably just as easy to look at winter peak. I understand that the impact of this changes from line to line, but I just want to use one as an example.

And these are real dollars, right? We're looking at Project Appraisal Incremental System Values of Energy, Winter Peak. Those are real dollars, correct?

THE CHAIRMAN: 1993 dollars.

MR. SNELSON: It says at the top there 1993 dollars a megawatthour

MR. SHEPHERD: Q. Okay. So they're all in -- they're not nominal, they're real?

MR. SNELSON: A. They are--

Q. Thank you.

A. --without escalation.

Q. Good. And we've talked about this before, and I don't want to go through the issue again. I just want to get your update. These values go up until 2016, and then they drop and stay constant. Now, as I understand, we just graphically illustrated that to show you what we understand that to mean. This is on page 4 of Exhibit 938.

Will you confirm, subject to check, that the cross-hatched, or whatever that's called, area at the bottom represents the area of your winter peak values of energy, fairly? Subject to check, of course.

A. It looks close. Again, subject to check, yes.

Q. Great. Now, you explained, I think, in Panel 3 maybe, that the reason why we see this drop at the end of the current planning period for all the rest of the years is that you take the average of five years or something and you apply that average then to all the rest of the years in real terms; is that right?

A. That is correct.

Q. Okay. And the effect of that is that if there are increasing power rates, or sorry,

increasing values of winter peak energy, those increases aren't captured, correct?

A. I'm sorry. What increases aren't captured?

Q. Well, if you just take a look at this chart, you will see there's roughly a trend upwards, and, in fact, we've drawn it for you in case it wasn't that obvious, but your assumption cuts off those additional increasing values, right?

A. Well, you are presuming those increasing values are real and are expected.

Q. No. All I'm asking is if they are there, you would cut them off, right?

A. Well, quite clearly, that is so.

Q. Great. Okay. And the my question is: That methodology is something we discussed earlier; have you made any change to that methodology to try to adapt your system incremental costs for trends in values?

A. Well, the trend that you've shown here is quite inappropriate.

Q. It may well be.

A. We haven't changed our methodology with respect to the long term since Panel 3.

Q. Are you reviewing it? Are you

looking at it critically to see whether it should be changed?

A. I don't know of any active process to redo it.

DR. CONNELL: I wonder if I could just interpolate a question?

I'm afraid, Mr. Snelson, I got lost in your responses to questions about the impact of the switch from -- from Lakeview to Lennox, particularly on the costs of capacity, and I wonder if this would help me to understand. Let's suppose there had been no other changes between March and the date of the new SICs, except the change from Lakeview to Lennox as the reference generation source.

Would we have seen, in fact, much change in the magnitude of the SICs for cost of generation in those first 15 or 16 years?

MR. SNELSON: At a reasonably high capacity factor where you have both capacity and energy values, then the change would have been much less proportionately than this change that we're looking at which is only in the capacity values.

DR. CONNELL: Yes.

MR. SNELSON: I'm just trying to do some quick arithmetic here to try and give you an order of

magnitude, but if the change is $30 per kilowatt per year between the two sets of capacity values, and if that is evaluated on something which has, say, equivalent use of 5,000 hours a year, which is -- I'm just choosing a round number, but that's about 57 per cent capacity factor, so it's a moderately high capacity factor but not as high as the system average.

Then you divide the 30 kilowatts -- $30 per kilowatt per year and you would end up with six $6 per megawatthour, I believe, if I've done my arithmetic correct.

So, if you look at Figure 1, Combined Values of Power and Energy, then -- and that is at 70 per cent capacity factor, that is on page 10 of the attachment, then with regard to the planning values, that could explain the order of $5 or $6 dollars per megawatthour difference between those figures.

DR. CONNELL: Yes.

MR. SNELSON: Which in fact is quite a large proportion of the difference in the planning values.

DR. CONNELL: Thank you.

MR. SHEPHERD: Q. Mr. Snelson, just looking at that Figure 1, it looks like $5 or $6 for most years is almost all of that difference, isn't it?

Most years, not all years.

MR. SNELSON: A. Not all years. It is -- it is a -- quite a proportion of it, yes. There may be some other offsetting factors that have gone one way or the other.

Q. Of course. All right.

Mr. Burke, let's come back to you and the load forecast. And I wonder if you could look at your load forecast report. I'm on page one. You will see in the -- do you have that there, Attachment C of Exhibit 796?

MR. BURKE: A. Yes.

Q. And On page one in the second to the last paragraph, there's a reference to more complete documentation being available on short-term analysis. It looks like the end-use model results, the EEMO model, demand management impacts. You have more stuff coming on this, right?

A. Yes.

Q. And so I wonder if you could just undertake to file those things when they're ready. Could you do that?

A. When they're ready, certainly.

Q. Wonderful.

THE CHAIRMAN: That's been the practice,

but do you want it enshrined in an undertaking?

MR. SHEPHERD: Yes, Mr. Chairman. I don't know which ones they will think are relevant, so...

THE CHAIRMAN: All right. What's the next undertaking number?

THE REGISTRAR: Point 7.

---UNDERTAKING NO. 940.7: Ontario Hydro undertakes to file more complete documentation on short-term analysis: end-use model results, the EEMO model, demand management impacts.

MR. SHEPHERD: Q. Now, Mr. Burke, in general terms in this forecast, do I understand your evidence to be that electricity prices are increasing and so more of the demand management that you are after originally will now be naturally occurring rather than program driven. Is that a fair characterization?

MR. BURKE: A. Well, actually comparing this forecast to last year's, there's very little difference in the electricity price scenario; and so between this year and last year, that is not a major factor.

Q. But isn't it correct that you are expecting a lot more demand management to be naturally occurring rather than program driven?

A. I wouldn't describe it as a lot. A

little bit more.

Q. Wait a second.

Okay. I'm going to ask you to look at page 4 of Exhibit 796, the main component. And if you take a look, after the first set of bullets, you see the paragraph that starts "at a significant portion," and you have said:

> Energy management potential is going to come now more from code standards and information-driven fuel switching with less emphasis on financial incentives.

Then you go on to say that the price differential between gas and electricity is now seen to be sufficient to encourage conversion to alternate fuels.

And, I guess -- in fact, you go on to say later that you expect to have less opportunities for program driven demand management because of what you call the changing economic outlook in the energy picture.

And I guess I had understood that all to say we're not going to do as much; the marketplace is going to do more by itself. Am I understanding that wrong?

A. I believe you worded your question in terms of efficiency improvement, and now you're

generalizing to demand management as a whole. I don't consider fuel switching to be in the same category as efficiency improvement, so my answer referred to the efficiency improvement portion of the demand management program. What the text you're referring to here refers to is largely the fuel switching component, which is a function of the relative price of electricity and gas; and there, as I said in my direct evidence, gas prices are significantly lower, and that is a change. And I also suggested that there was a behavioural change going on in response to that relative price differential in my direct evidence.

Q. Okay.

A. But the answer I gave you to begin with was how much natural efficiency improvement is going on and in response to a change in electricity prices, that's what I understood your question to be, and in that, my answer stands.

That's not very much price induced -- sorry. That's not very much price induced demand management, although demand management will, in fact, occur naturally in the marketplace more than your current estimates.

Q. Demand management I'm talking about now; is that right?

A. Well, if you're talking about demand management, that's different from the question you asked me to begin with, and there is a fair bit of price-induced fuel switching in this forecast, and that's not just a function of the electricity price. It's a function of the electricity price and the gas price.

Q. Great. Your methodology has population driving GDP; is that right? I'm just trying to remember from --

A. Population is an input to one of the forces that determines long-term GDP growth. Long-term GDP growth may sometimes be forecasted using labour force growth and output per employed worker, and labour force is a function of population. So indirectly, yes, it drives GDP in the long run.

Q. Okay. Now, you're estimating faster population increases than in your last load forecast, right?

A. Yes.

Q. Okay. But you're also estimating lower GDP growth in the short term or maybe a lower starting point. I don't know, one or the other; is that right?

A. Growth rates are about the same for

the first two years compared to a year ago and then they get higher, but, yes, they start from a much lower base.

Q. And then those facts, the population increase and the lower GDP amount, tend to offset each other, right?

A. Well, I indicated in my direct that the effect of the higher population growth tends to raise the GDP forecast about 4 per cent relative to what we would would have gotten last time. And since we lost about 6 per cent over the last couple of years one way or the other, we get to, at the end of the period, within about 2 per cent of the level for GDP in 2015 that we've said in 1991.

Q. Great. Now, you've also assumed in general an increase in energy, sorry, in electricity intensity in the economy; correct?

A. I haven't assumed that; I derive it.

Q. Oh, sorry. It's not historical data, but it is a calculation you have made from other assumptions?

A. Well, after we get the load forecast for the purpose of demonstrating some of the properties of the load forecast, we proceeded to divide the primary load forecast by the GDP levels to determine

what the electrical intensity turned out to be.

Q. Oh, I see. So where you say on page 4 of your load forecast, you say both EEMO and the end-use system became more electricity intensive as the quality of these models improved, electricity intensity is a result that kicked out of those models after you've run them, right?

A. Yes. We're now going over very old ground, because the change that you're referring to was between the '89 and '90 forecast.

Q. Yes.

A. And, yes, in the case of the econometric models, you estimate the equations; you see what the answer is. In the case of the end use, we incorporate the latest data that we have, calibrate to that data, and then we can determine after the fact that, yes, electricity intensity, the amount of electricity used per unit of output, has changed.

Q. Okay. I'm sorry I'm going over old ground. I didn't mean to. What I'm really after is this: That electricity intensity, because it's a result, that increase suggests that our use of electricity in the economy is going to increase faster than our demand management, our conservation of electricity over the same time frame, right?

[12:06 p.m.]

A. I think we're comparing apples and oranges here. I'm really not sure what you're getting at.

Our forecasts that we have before the Board now shows electrical intensity falling faster in this forecast than in either the previous one or the one before that for very many reasons.

How that relates to demand management I don't -- I don't understand. With respect to --

Q. Your expected -- your basic load forecast assumes more demand management than the last one; right?

A. The basic load forecast has more people converting from electric space heating to natural gas and a lower incremental market share of electricity in those markets than the last one did.

Is that the same thing that you just said?

Q. Well --

A. I shouldn't be asking questions, sorry.

Q. I asked demand management; right? There's more demand management in your basic load forecast than the last time. I mean --

A. By definition the word 'demand management' to me means something that you actually manage as opposed to a response to market forces. the basic load forecast doesn't so much have demand management in it. It has fuel switching, it has efficiency improvement.

Q. Whatever you call it, all those various decisions to use less electricity - right? - a nameless group, they are not going to be as much in our estimate as the increases in electricity use from other sources, for example industrial processes, et cetera; is that correct? That's the effect of saying there's going to be more electricity intensity; right?

A. I think the total change between '89 and '90 load forecast in broad electricity intensity terms, holding the other variables constant as much as I think we could, was of the order of 7 or 8 per cent. In the demand management that we had in the 1991 forecast, which if it isn't as a program -- just the program component, I think, was reducing demand 14 or 15 per cent by the year 2000 and much more by 2015.

I'm not sure where you are getting the inference from.

Q. Last sentence of page 4, it says:

It is the increase in the electricity

intensity of the forecast that kept the 1991 basic load forecast very close to the DSP levels.

And we have here this whole discussion about -- your projection that Ontario will continue to be more electricity intensive, and you have just said that is a result of your models, that is not an assumption. So I don't know --

A. It's the change. I can't tell you what the total amount of -- in fact, it would be a major job to calculate what the total increase in intensity is over the period relative to the total increase in efficiency.

All I was indicating was that between '89 and '90 or '91 load forecasts the model results would give a higher value, a higher amount of kilowatthours consumed per unit of GDP for all manner of reasons. It could be because the market shares were higher; it could be because we learned more about the actual use of electricity per unit of output, all manner of reasons. And that was in the model changes that were going on between '89 and the '90 load forecast primarily.

There is an interrogatory response that explains all of that as well.

Q. Yes, I know. I'm only concerned with this load forecast. Maybe that question is a much simpler one.

Taking all things into account, is it your current projection that the electricity production in Ontario per unit GDP is going to increase over the planning period or decrease over the planning period?

A. Electricity consumption?

Q. Production consumption.

A. Per unit of GDP as indicated in...I guess it's page 6 of Exhibit 937 was in order, I believe. And it declines pretty steadily and fairly significantly from its 1992 levels.

Q. Let me just see that --

A. And at a faster rate initially than the previous two load forecasts.

Q. What page is it?

A. Page 6.

Q. And so if I understand this correctly then -- I'm going to have to think about this. I'm lost. I mean, I know what you are saying. I understand what you are saying; I'm just lost.

Let's go to page 3 of your load forecast. And the first paragraph there says:

The first is a one-to-one

relationship between Ontario GDP and basic load in the long run.

That would be -- in a model like EEMO, you would have that sort of a relationship; right?

A. Yes.

Q. But that wouldn't arise in your end use model unless the end use results achieved it by coincidence; right?

A. It would be very difficult in the end use model to isolate what the strict relationship between Ontario GDP and basic load is, for a variety of reasons.

The reason you can do it -- to make it simple, the reason you can do it in the econometric model is you specifically isolate the effect of GDP from that of prices and any other factor that happens to be in the equation, but in the end use model you are not -- often not dealing with GDP in terms of value added, you are dealing with physical units like numbers of houses, and square footage, and tons of steel and so on.

And you can after the fact calculate what the end use forecast is per unit of GDP, but the part that is purely associated with the GDP that is not a function of the change in prices and so on, and other

assumption changes, that's very difficult to isolate.

Q. This year you have elected to use the end use forecast as the forecast ones you tuned it for the long term; right?

A. Yes. And that's not too different from what we did last time in 1990.

Q. Understood. But there is a very big difference between the EEMO forecast and the end use forecast this time, isn't there?

A. I do believe there's less difference than last time that both were done in 1990, but it's roughly the same. The commercial sector models for the econometric and end use were dramatically different. I believe they're 25 terawatthours different in 2015 and they are only 20 terawatthours in this forecast.

So I think that -- well, it's close. I mean, the econometric model was higher last time and it's higher this time.

Q. Am I going over old ground here? Because if I am I don't mean to.

A. In my view, yes.

Q. I'm sorry. Let me just ask you the final point in this then, and you can tell me whether that's already been covered, too.

Is the effect of using the lower end use

forecast to in effect degrade that one-to-one relationship between GDP and load; that is to say, because it's lower, you are not assuming that one-to-one relationship anymore, are you?

A. I think that's a reasonable conclusion, that if we could pull it out of the end use model we would get a lower number than one-to-one.

Q. And maybe that answers my question about this page 6 of Exhibit 937, because using the end use model with a lower ratio of -- or implicit lower ratio of GDP to load would produce this lower energy intensity, wouldn't it, per unit GDP?

A. Well, it does, but the major determinant here is the prices, you know. If you have a large proportion of the space heating load that was electric shifting away from electricity, then the primary electric load is going down and you haven't changed GDP.

So it has nothing to do with GDP or the ratio between -- see, the ratio that I'm giving you for the econometric is not load divided by GDP; it is how much load would change for the change in GDP. So it is a sort of a before-the-fact kind of empirical relationship.

What we're calculating here is after I've

got the load now divide it by GDP, and lots of the changes are to the load, not to GDP or to the relationship between load and GDP per se. It's because we've changed the prices, and so we've lost a lot of the space heating load.

We lost it through programs last year, and this year we're losing it in response to market forces more.

Q. Now I do understand.

Could you turn to page 10, please? No, actually, skip that. Why don't you just go over to page 17. I'm going to leave my demand management questions to somebody who understands them better, because I'm not doing very well with them.

Page 17, this is a chart I had a lot of problem with. This chart seems to suggest that all of your forecasts from '88 through '92 of electricity prices had the same number for 1991.

Now, I must be misunderstanding that; right?

A. Yes. [Laughter]

Q. Now, if the 1988 forecast had 1991 at say 10 per cent higher than it actually was, then the low line you have here for the 1988 forecast, that would actually be much higher; right? Everything would

be higher on that line, if you were looking at real prices, real forecasts instead of index?

A. This is a plot of an index against 1991 equals 100, as it says underneath the title.

If you want to get a plot of what the relative -- you know, the absolute price changes are you have to look at a different plot, because this is specifically designed to normalise all the numbers in 1991 so that you can see the changes from 1991 on.

Q. What is it we learn from this chart, then?

A. We learn that --

Q. What conclusions can we make?

A. -- that from 1991 on electricity price increases are higher in later forecasts from '88 through '90, but they're pretty similar in the '91 and '92 forecasts.

Q. Can we conclude that from this if these aren't the real prices that you have estimated?

A. These are -- what we're talking about is the rate of change. The rate of change you can conclude from this.

Q. So it's like the shape of the line?

A. Yes. You can conclude that from -- the 1992 forecast is 20 per cent, where it's -- by '94.

So it seems to be at an index of 120, that that forecast is 20 per cent higher than the 1991 price, and the '88 forecast looks to have been in real terms a little less than the 1991 price. You can conclude that.

Q. Now, if you had a chart of your actual electricity price forecast, put them all in the same dollars, it wouldn't look anything like this; right?

A. How do you mean it 'wouldn't look anything like that'?

Q. Well, all of these forecasts didn't have the same number for 1991, did they, so they wouldn't cross at the same point; right?

A. That's true. But the change from 1991 on would be correct if it's correctly portrayed by this one.

Q. I'm not arguing with the shape, Mr. Burke. But it is true, isn't it, that from this chart we can't tell whether, for example, the 1988 forecast wasn't way above the 1991 forecast, or vice veresa. We can't tell that.

A. What this chart indicates for 1988 is that it forecasts no real change in prices between 1988 and 1991.

What you can conclude, I guess, looking at the 1991 and 1992 forecasts which had the data for 1991 in it, is that there was in fact about a, oh, 4 or 5 per cent real increase between 1988 and 1991.

Q. Sorry?

A. Because you can see that the 1991 lines and 1992 lines start from -- their 1988 value is -- is about 4 per cent or so below?

Q. No, it isn't.

A. Sure it is. If you --

Q. That only assumes that 1991 is the same. If 1991 is different, and in fact in these forecasts it would be, then isn't it correct that all of the other relationships are also different?

A. I'm trying to be helpful. If you look at the 1991 and 1992 lines for 1988 you will see it is below 100.

Q. Yes.

A. So the difference between where there are in 1988 and where they end up in 1991 tells you what the price difference in those -- between '88 and '91. And that is the extent to which, if you were to have revised this plot and not tried to index them at 100 in 1991, the lines would shift. The lines would move up by the gap that exists in 1988 between the

lines. That's all that would happen. It would shift up.

You could index this to 100 in 1988 and have all of the lines move from there, and the difference would be to spread the lines apart by the gap between 1988 -- that exist between the lines in 1988 on that plot.

Q. Well, in fact, if you look at the next page this is your natural gas price forecast.

Now, for some reason you didn't use an index method for this. You used actual prices. So this tells us the relationship of each forecast to the other forecast; right?

A. Yes, I --

Q. You can see that?

A. Yes.

Q. Whereas the previous chart doesn't tell us that, does it?

A. No.

Q. Good.

A. Not directly.

Q. By the way, this chart on page 17 doesn't include a 1989 line. Was there no line for 1988; is that...?

A. I only -- all these comparisons, as

you may have noticed, right through this section are for four forecasts: the DSP forecast; the 1990 forecast, which was the basis of evidence in Panel 1; and the 1991 forecast, which is the update; and the 1992 forecast, which we are here about.

The DSP forecast was based on the 1988 basic load forecast.

[12:20 p.m.]

Q. All right. The chart on page 17 says it comes from the Energy Price Trends report November, 1992, but I had looked in there and I couldn't find it.

Can you show us where it is? Perhaps just undertake to tell us where it is when you find it.

A. I think you may have a point, that it is the '91 and '92 results that you will find in the retail -- that particular issue of the Energy Price Trends document, and the other lines must come from earlier versions of the Energy Price Trends document which were filed.

Q. I will find that for the chart on page 18 as well, that you have cited it as Energy Price Trends but it is not actually in there; right?

A. Yes, the current information is from -- sorry, the information that refers to 1991 and '92 is in the Energy -- this issue of the Energy Price

Trends document, but the others were added and you have to go back to previous Energy Price Trends documents for those.

MR. SHEPHERD: All right. Mr. Chairman, that may be a good time to have lunch.

THE CHAIRMAN: All right. We will adjourn now until a quarter to two.

THE REGISTRAR: Please come to order. This hearing will adjourn until a quarter to two.

---Luncheon recess at 12:26 p.m.

---On resuming at 1:47 p.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Please be seated.

MR. GREENSPOON: Mr. Chairman, I asked Mr. Shepherd if I could just have a word before the Panel...

Given the way the cross-examination is proceeding it appears as though there is a good chance that the motion will in fact be heard next week, and I just wanted to go on the record seeking Hydro's written response to that motion so that I will have some time to consider it and we are not taken by surprise. As yet Hydro has not filed anything with respect to the motion.

MS. HARVIE: Yes, I can respond to that,

Mr. Chairman. We are finalizing our written submissions now, and I expect they will be in as soon as possible. We haven't yet received final instructions at this time.

THE CHAIRMAN: Thank you.

Is Mr. Mattson here? Yes. We have a letter from you about the process in connection with the Northwatch motion, Mr. Mattson. You wanted some advice as to whether you could raise the issues that you raised in your letter?

MR. MATTSON: Yes, Mr. Chairman. I believe I sent that letter to yourself, to Ontario Hydro, and sent a copy to Mr. Greenspoon as well.

THE CHAIRMAN: Well, I think it would be appropriate that any submissions you want to make then should be made at that time.

In general - in general - any submissions that any party wants to make about the termination of the hearing in response to the Northwatch motion or as to the future of the hearing in general this is the time they should do it so that it will all be done at one time. We want to avoid the possibility of someone coming along later and saying, well, you have disposed of the Northwatch motion, but I still have these concerns and that concern about the future of the

hearing.

I think that anyone who wants to say anything to us about the future of the hearing either pro or con should do so contemporaneously with the Northwatch motion. This does not mean that there may not be some procedural things to work out at the time, but I think we will deal with that when it arises.

The position that I feel now, speaking for myself, is that the motion has been made by Northwatch, and Northwatch will be the first submissions that we hear. How we deal with the others we will have to see, depending on the nature and extent of them at that time.

MR. MATTSON: Thank you, Mr. Chairman.

THE CHAIRMAN: Now, Mr. Shepherd?

MR. SHEPHERD: I do hope on the motion we will have a 'confused' category and continue that process.

THE CHAIRMAN: Well, it would be the first time that we haven't had one so... [Laughter]

MR. SHEPHERD: Q. Mr. Burke, there is a background study being prepared on the statistical relationships contained in EEMO. Do you know when that will be released?

MR. BURKE: A. I am aiming for some time

in February.

Q. I wonder if you could undertake to file that then, please?

A. I think that is part of the package I undertook to file this morning.

Q. Is it? Wonderful. Okay.

If you would take a look at page 22 of the load forecast report you will see there is a list in the middle of page 22 of five things that are common between the EEMO approach and the end use model. That is what that list is; right?

A. Yes.

Q. And the second item on that is the projections for natural NUGs. I take it that it is fair to say that natural non-utility generation is in fact affected by end use issues, isn't it?

A. Did you say is 'affected by' end use issues?

Q. Yes. In the same way as demand management in particular sectors is affected by the development of a particular industry, et cetera.

A. Well, the methodology we have used to forecast is the one that is discussed -- that we have been discussing in chapter 4 of this document with the addition of industry-specific detail as provided by our

NUGs division, but it is not based on an industry-by-industry analysis. There is no other analysis of the amount of natural load displacement non-utility generation other than the one we have been discussing.

Q. Of course not. Of course. I understand. That at least I got out of our discussion this morning.

The question is, when you do an end use analysis, for example for steel, you make assumptions about growth in the area, you make assumptions about electric arc as opposed to more conventional approaches, and all of those same assumptions and considerations would go into whether companies in the steel industry would cogenerate; isn't that right?

A. The end use forecast is a forecast of demand for electrical services essentially in Ontario, and it doesn't concern itself with how the companies choose to supply those.

Use of end use detail could supplement some future analysis of natural load displacement non-utility generation, but we haven't used it that way so far.

Q. All right. Let me go to something I know is one of your favourite topics, load forecast uncertainty, page 127 of the load forecast. Do you

have that, Mr. Burke?

A. Yes.

Q. Now, your load forecast band width has gotten narrower again, hasn't it?

A. Yes, it is slightly narrower.

Q. And if I understand these three numbered points are to essentially explain why that is; is that correct?

A. Yes.

Q. So point No. 1 I am familiar with. That is that discussion about using a larger standard deviation where population increases are larger and vice versa? That is what your methodology is; correct?

A. Yes.

Q. So we have already gone over that in some detail before?

A. Yes.

Q. The second point has me a bit baffled, and I suspect it is just too technical for me. Could you just sort of paraphrase it?

A. Well, essentially there is an equation that between load and GDP, and the data that was used for GDP in that equation was revised.

The effect of that revision was to improve the fit of that equation. Therefore, there is

less residual uncertainty, less residual error. So that component which is simulated, the residual error of the equation, actually turned out to be smaller and its contribution to overall uncertainty was therefore smaller.

Q. So now, the historical data is data you get from StatsCan; right?

A. Yes.

Q. And they revise their data and provided new data for the same period?

A. Yes.

Q. Okay. Did you then re-estimate your function or did you just apply the same function and find it had a better fit?

A. I believe we were simply trying to use the same methodology as before. So we used the same specification; we just put in the current version of the data for GDP and ran it as before.

Q. Okay. I understand. The third point then is - and this is the one I had the most trouble with - it sounds like what this point is saying, and correct me if I am wrong here, is that in Hydro's methodology the higher the projections of energy growth, the greater the uncertainty band width, and vice versa; is that right?

A. I'm not sure whether I am answering your question directly, but I think the only point that is being made in point 3 is that because the median value of the basic load forecast is lower the absolute size of the band width is lower, but in percentage terms, other things equal, it would be the same.

It is simply saying that the band width is scaled to the level of the median. The median goes down seven per cent for the basic, so other things being equal the absolute gap between these numbers you would expect to be seven per cent less, is what this point is saying.

Q. Okay. Now, I don't understand why that is. The logical result of that then presumably is that if you project zero growth you are 100 per cent certain of that projection; isn't that right?

A. No, it would be plus -- certainly one would not want to take it to that degree.

Perhaps what I should do is to -- the point is explained a little bit more in the next page, but -- should get some clarification.

This is not a substantive issue here. This is a small portion of the difference. In fact, it is not explained -- it is only meant to...

Q. Mr. Burke, would you rather think

about this and deal with it tomorrow?

A. Yes. I guess what I was going to propose is if there is some point that is not made in these pages that clarifies the issue that you have brought up about 'surely if you were to go in the extreme of this there must be something wrong' I will make it in an undertaking of some sort.

Q. You can make it an undertaking if you want. Sure.

A. Yes.

THE CHAIRMAN: Undertaking No. 8, is that right?

THE REGISTRAR: No. 8, correct.

---UNDERTAKING NO. 940:8: Ontario Hydro undertakes to provide clarification of point number 2 on page 127 of the load forecast.

MR. BURKE: As Mr. Shalaby is pointing out to me, the issue -- the growth rate isn't the issue. The band width is about the level, and so the band width would still be plus or minus 20 per cent or so, about the level, whatever the growth rate is that is projected.

But as you change the level of the median forecast you do -- because it is 20 per cent of whatever that level is you actually narrow the absolute

band width. That is the only point of this. I don't think there is anything more or less to it.

MR. SHEPHERD: Q. The question I am asking is, what is the reason why uncertainty is less because load is lower?

MR. BURKE: A. I guess what we are saying is percentage uncertainty is the same, not absolute uncertainty. But if that point needs further explanation I can't offer it to you off the top of my head.

Q. All right. Thank you.

MS. HARVIE: Perhaps just to save ourselves some paperwork if Mr. Burke could give it some thought this evening and then advise you in the morning, if that would be satisfactory?

MR. SHEPHERD: That's fine.

MS. HARVIE: If you have got any follow-up questions it might be more efficient than doing it in writing.

MR. SHEPHERD: No problem.

THE CHAIRMAN: So we won't lose sight of it we will keep it on as number 8. We have already had a couple satisfied in that fashion so we can do it that way--

MS. HARVIE: Oh. All right.

THE CHAIRMAN: --so we won't forget about them.

MR. SHEPHERD: Excellent, Mr. Chairman.

Q. Let me take you to the main text of Exhibit 796, and on the second page you talk about -- you refer to the fact that the September board memorandum wasn't enough to make a number of decisions because there was -- this is the quote here: additional analysis of the environmental leadership, legal and hearing implications, et cetera, et cetera, was required.

And I take it that that analysis was then done by October when the decisions were made; right?

MR. SNELSON: A. To some degree, he yes.

Q. Okay. And then I would find that in the October board memorandum which is attachment A, wouldn't I?

A. That is the documentation that supports the October board memorandum.

Q. But that additional environmental and similar analysis, that would be in this attachment A; right?

A. To the extent that it has been documented, yes.

Q. Okay. And I looked at this document

A and -- or attachment A, and if you look at page 5 of that, as I understand this heading, "Economic Evaluation of Capital Alternatives", the only ranking you have in fact provided to your board and you prepared for decision-making purposes, put it that way, is still an economic ranking; right?

A. Yes. That was available I believe in September as well.

Q. So it is the same economic ranking from September unchanged?

A. I believe so.

Q. Okay. And then I see that you have in -- I thought I saw... Wait a second. Here we are.

I see that on page 10 you have now some data on air emissions. That is new for October; right?

[2:05 p.m.]

MR. DALZIEL: A. That's right.

Q. And I also see on pages 12 through 15 a summary of each of the various recommendations together with sort of a brief encapsulization of the implications, some economic, some not economic, and so that includes some environmental and other analysis; correct?

MR. SNELSON: A. Yes.

Q. And that is also new from September?

A. Some parts of it is.

Q. Yes. Is there any other environmental analysis of these October decisions?

A. I think with the previous cross-examiner, Mr. Castrilli, we established that that was the -- the main part of the environmental analysis that was done. There was not a fully comprehensive environmental analysis similar to that that preceded Panel 10 or was given in Exhibit 4. We have already discussed that with Mr. Castrilli.

Q. Fine. Sorry. I didn't mean to go over the same ground again.

In these pages 12 to 15 I see a summary of the implications of changes to the demand management plan, to a number of hydraulic developments, the emissions control program, Manitoba, fossil stations. But, you know, at the very top of your list of economic ranking was a reduction in NUGs, and I didn't see that in here. Have I missed it?

A. I don't think there was any -- I don't think you've missed it.

Q. It is just not there?

A. There was a decision made in October with respect to further tightening of the NUG program, and that is point (h) on small Roman numerals (ii) of

the Executive Summary of Attachment A.

Q. It's correct, isn't it, that the only information in this board memo with respect to that is the economic ranking of the options?

A. Without careful reading of the document again with that in mind, I can't bring anything -- I can't bring anything to your attention additional to that.

Q. Great. I'm going to ask you to turn to attachment B, and this is -- I fear I'm going to get bogged down here. I'm going to ask you to turn to page 20 of appendix A of attachment B to Exhibit 796.

Do you have that, Mr. Snelson?

A. I believe so, but perhaps if you can just tell us what the words are at the top we'll make sure we've got the same page in front of us.

Q. It starts out, "From the perspective..."

A. I have that page.

Q. Wonderful. Now, this document that we are in, this is the report of the Vice-Presidents' Review Team, right?

A. Yes.

Q. And this report was, in fact, tabled by the Chairman of Hydro to your board in September;

correct?

A. Yes, and there was a -- an Executive Summary that was added to that.

Q. Yes, of course. Okay. Page 19 and 20 of this report, where I took you to, appear to me to discuss what to do about falling nuclear performance. And in essence, this appears to say Nuclear Operations Branch says, give us more money and things will get better, and the Committee of Vice-Presidents is saying, why should we believe you now. I'll read you the exact wording. It is on the top of page 20 where it says:

> From the perspective of the Vice-presidents' Review Team the issue is one of credibility. If the planned capital and OM&A expenditures produce the forecast results they are clearly economic and will contribute to lower increases in rates for our customers. However, recent experience has seen significant increases in expenditures with no clear indications of improving results.

Now, that quote is referring to nuclear operations; isn't that correct?

A. Can you just give me a minute to

read--

Q. Sorry. Go ahead.

A. --the preceding page as well?

Sorry. Can you repeat your question now? I've had a chance to read it.

Q. My question is the quote I just read to you, that refers to Nuclear Operation expenditures, doesn't it, I guess and capital as well?

A. Yes.

Q. Okay. And, if I understand the second paragraph there correctly, it says that the Vice-President of Nuclear Operations was asked to go back and look at his budget again; is that fair?

A. Yes. I think this is in the spirit that all vice-presidents were being challenged to review their budgets and keep them as far as possible in line with previous levels of budgets and avoid increases.

Q. So notwithstanding the issue being one of credibility, this is just normal "go look again" sort of discussions?

A. No, I don't think it's just normal "go ahead and look at things", but it is part of the larger process whereby all budgets are being challenged.

Q. I would like you to go to appendix 2 to this report. We are now in appendix 2 of appendix A of attachment B, I should tell you. Appendix 2 is closer to the back. It is headed up "OM&A and Program Costs". And I assume that this first page, which is headed up "OM&A Program Costs, Corporate Improvements", September, '92. Do you see that page?

A. I have the page.

Q. Okay. That is the numbers coming out of the report of the vice-presidents, right?

MR. DALZIEL: A. Sorry. I was just organizing some pages. Could you repeat the question?

Q. Okay. In fact, maybe I will give you both questions together.

The first page, headed up "Corporate Improvement", that is the numbers coming out of this report of the vice-presidents, and the next page, reference level February, '92, is the numbers they started with; is that right?

A. That is my understanding.

Q. Okay.

A. That's right.

Q. Could you just hold your thumb there and go right to the back of this part of the package? This is right to the back of attachment B.

Now, I have a page in there in my copy that also says "Corporate Improvements", September, '92. The only difference between this page and the earlier one we were looking at is that the earlier one has 10:11 a.m. on September 11th, and the other one, the one we were just talking about, has 6:05 p.m. on September 11th.

Could you explain?

A. There's a correction in the Information Management and Workplace Services line.

Q. Okay.

A. The one that was published at 6:05 p.m. contains the corrections.

Q. Excellent. So we should just ignore this page that has 10:11 on it? That's wrong, 10:11 a.m.?

A. Yes. I would use the one that is dated--

Q. Great.

A. --6:05 p.m.

Q. Okay. Now, can you look at the reference levels for just a second? This is the second page of this schedule 2, headed up "Reference Level", February, 1992. There's a line there that says "Nuclear Operations".

Now, I'm going to get to the substantive questions on this, but let me just clear up a technical issue here.

If you look at the notes at the bottom - let's see if I can find it - the fourth line from the bottom, it says:

> NOB - which is Nuclear Operations - does not include funds associated with boiler problems at Bruce and Pickering, $30 to $40 million in '92.

Why are those figures not included in the Nuclear Operations figures?

A. I can't tell you exactly the reason why those aren't included. It may be that the numbers are still under consideration and to determine the extent to which they should be included or when they would be included.

Q. Can you tell me, are they included anywhere else in this?

A. I don't know if they've been included in the first page that refers to the September, '92 values. I believe that is what the note "not resolved" on the far right-hand side refers to, those kinds of considerations.

Q. All right. Can you confirm, Mr.

Dalziel, that the reference level budget that we have just looked at, the Nuclear Operations, increased in real dollars from 1991 to 1996, over five years, by 15 per cent roughly?

A. Roughly that looks about right.

Q. All right. Now, that is a little bit of an understatement, isn't it, because isn't the line "COG Funding", isn't that also Nuclear Operations?

A. No, I don't believe it is.

Q. Well, isn't that the funding of the CANDU owners group?

A. Yes. It's the funding of the CANDU owners group, but it's not part of the Nuclear Operations Branch.

Q. Oh, sorry. I misworded my question. It, however, is an operating expense to do with nuclear, isn't it?

A. It may include more than just operating. It may include moneys for capital budgets.

MS. HARVIE: Mr. Chairman, if I may --

MR. DALZIEL: Now, this is --

THE CHAIRMAN: Just a moment.

MS. HARVIE: Mr. Dalziel, just a moment, please.

If I may just rise at this point, I am

hard pressed to unde stand why the details of the COG budget are relevant to Panel 11. They were at any rate discussed, I believe, on Panel 9, and I don't have any inkling how this is relevant to matters that have changed since Panel 10.

MR. SHEPHERD: Mr. Chairman, one of the issues in this hearing, as I understand it, is going to be the proper assumptions for nuclear operating escalators, capital modification escalators, et cetera.

I believe that through this set of questions I will be able to demonstrate that Hydro, which has for a long time said that it should be roughly inflation for those items, that in fact they are now projecting not only above inflation as they did last year but, even more than that, in a period of austerity.

Now, I think that that --

THE CHAIRMAN: But doesn't that speak for itself? I mean, the COG funding, we know what it is, and there it is, and those are the figures.

I mean, are there any questions you want to ask about them?

MR. SHEPHERD: No, I made my point on COG funding.

THE CHAIRMAN: All right.

MR. SHEPHERD: But I do wish to go on and ask additional questions about the nuclear operations budget and how it has changed.

THE CHAIRMAN: Well, you can do that.

MR. SHEPHERD: Okay.

Q. Mr. Dalziel, still on this reference level chart, if you look at the bottom of the page you will see notes, and there are a number of accounting changes associated with nuclear operations.

Now, I assume if we are looking at the increase in budget to see how it relates to inflation, for example, that we have to adjust for accounting changes because those aren't really increases or decreases; correct?

MR. DALZIEL: A. I guess it depends on the specific nature of the accounting change, but in general, yes.

Q. Okay. So we have got accounting changes for '95 and '96 for heavy water of, let's say - we'll look at '96 - $62 million. As I understand that, the number in the chart above is $62 million more than it would have been because of the accounting change, okay; isn't that true?

A. It may be that is $62 million less. I think you said $62 million more?

Q. No. My question is that the figure of 836 in 1996, 836.4--

A. Yes?

Q. --if it wasn't for the accounting change that would in fact be 898.6, wouldn't it?

A. That is what's indicated here, yes.

Q. Okay. So if that is the case, then it is correct that the real increase, if you compare apples to apples, is about 25 per cent over five years; correct?

A. Subject to check, it may be that much.

Q. Okay. Now, against the background of the comments I read to you earlier from the other report, I would like you to look at then the page before, which is actually I guess the last page of attachment B, the correcting page, okay, headed up "Corporate Improvements", September, '92, and it has the time dated -- time stamp at the bottom, 6:05 p.m.

I look at that and I see the indication for nuclear operations, the first line, the question -- the notation "not resolved". Do I take it that is a reference back to the earlier reference that the Vice-President of Nuclear Operations Branch was told to go away and look again, or is it something else?

A. I think that may be part of it, and there may be additional factors as well, such as the one you just highlighted, the accounting treatment on heavy water.

Q. Okay.

MR. SNELSON: A. One of the factors you have to take into account in reading this line is that it is during a period when Darlington is coming into service, and there are costs of people who work at Darlington who up until the in-service dates of the units will be capitalized and treated as part of the capital cost of the station and on the in-service date they become part of the operating budget of the station.

Q. Yes.

A. So there is a natural increase in this budget as the new plant comes into service.

Q. Okay. Good. Do you know how much that is?

A. No. I think you -- in digging into the details of this table you are into an area that neither Mr. Dalziel nor myself are very familiar with. We are attempting as best we can to answer your questions, but it's not an area that we are very familiar with.

Q. Okay. Well, I guess -- I only have one question on this anyway.

It seems to me there was a reference budget, which even adjusted was below $900 million in 1996, and the Corporate Improvement budget where you have slashed all the costs seems to me to show $921 million of nuclear operations. I guess I just don't understand what happened there.

Maybe you could explain.

[2:27 p.m.]

A. I don't think either of us is in a position to explain that and the factors behind that.

Q. On Wednesday we talked about the process of evolving these numbers, and I don't want to ask you to give me numbers that are still being evolved and haven't reached milestones, but this discussion does suggest that these nuclear operations numbers are in some sort of state of flux, and I wonder whether there is a new set of numbers that is at some sort of milestone stage that we could look at, that doesn't have a "not resolved" beside it.

A. As I say, this is an area of O&A budgeting which we are not really that familiar with. So there may be a new set of numbers associated with the -- a finalized '93 budget, but we're not aware of

them.

Q. I won't ask for an undertaking. I presume that sort of data would be filed in any case; correct?

MS. HARVIE: Well, assuming that it would be relevant -- and I'm not sure the witnesses are suggesting that it would be at all. In fact, the evidence would suggest that it isn't.

MR. SHEPHERD: Q. Could you look at attachment H to Exhibit 796, please? I don't know who this is that... It's a collective "you".

And if you take a look at page 3 of schedule 1 of that attachment, it says here -- no, I asked that already. Excuse me just a second.

Sorry. When I was skipping around I lost track of what I had asked and what I hadn't asked.

Under this heading "Nuclear" here, it says:

> A prioritized submission for all nuclear work should be submitted.

Is that a document that we could look at?

MR. SNELSON: A. I don't know.

Q. I wonder if you could just undertake to find out and provide it, if you haven't.

MS. HARVIE: Well, this may well be part

of the Bruce "A" review, and there isn't anything that has been finalized in any way. And so, I have no confidence that this has been finalized either, or indeed whether it's -- well, just what shape it is in. I don't know. And so I don't know that we could give an undertaking at this time.

MR. SHEPHERD: Mr. Chairman, I'm not asking for anything that hasn't been finalized. If a document has been finalized, I'm asking that it be tabled, that's all.

THE CHAIRMAN: This schedule 1 is an attachment to a letter or a memorandum from the CEO to the senior management committee, generally instructing them what he would like to have happen in the near future. It was put in, basically, to provide continuity.

I guess the question is whether this kind of submission is an internal management submission or whether it's something that Hydro wants to bring forward as part of its policy. That is the issue about it.

MS. HARVIE: Well, Mr. Chairman, I suppose I could respond to that.

I don't know if there is a document at all or what shape it is in, whether it is in draft form

and has never been finalized. And if that's the case, then it would be my submission that it is a draft document and doesn't reflect necessarily a corporate position that would be probative evidence in this hearing.

THE CHAIRMAN: I suppose anything that comes into the planning mode and becomes part of the tools used by planners to make decisions, then it would be relevant; is that correct?

MS. HARVIE: Well, yes, that's correct. I'm not sure that that is what the witnesses have said.

THE CHAIRMAN: I'm not sure they said anything about it one way or the other. (Laughter)

What about it, Mr. Snelson? Will you provide anything that goes into the planning that you use as a tool for planning the proponent's position?

MR. SNELSON: This document is not something that would be considered in long-term planning. It seems to be something that is part of the short-term budgeting, particularly in the period of constraint in the next few years.

MR. SHEPHERD: Mr. Chairman, I may be wrong, but I believe that what this document if it exists and is final is, is a list of all the things they have to fix on the existing system nuclear

stations and the order in which they have to fix them.

And given the fact that we are depending almost entirely on the existing system and heavily on nuclear over the next 20 years, I would have thought that what needs to be fixed is real important.

THE CHAIRMAN: I thought that was the subject matter of Panel 9, and if there has been any change in Panel 9 from that, that that would be part of what we have before us.

MR. SHEPHERD: Exactly. And I'm saying --

THE CHAIRMAN: That is, I guess, the form the questions ought to take.

MR. SHEPHERD: Well, Mr. Chairman, given that --

THE CHAIRMAN: We had quite a bit of evidence in Panel 9 about what needs to be fixed, and when it needs to be fixed, and if it needs to be fixed, and we know that there is the Bruce "A" study going on, and we know all about that; and I think if you can put your questions in that context rather than the context of this particular document, then we might be able to get the answers.

MR. SHEPHERD: Mr. Chairman, Hydro has filed a piece of paper that says that they have a

new -- or they are preparing some sort of new document on what needs to be fixed. I don't know whether they are in fact.

THE CHAIRMAN: No, no. That is not what this says.

This is the Chairman writing to his Vice-Presidents asking for some help and advice during the summer, and he's got all kinds of ideas that he wants. They may have said, very possibly could have said, you have got that, or you don't need that, or whatever.

This is just a continuity document. I am not going to take any more questions in that context.

MR. SHEPHERD: Well, Mr. Chairman, I haven't finished making submissions on the relevance of this.

THE CHAIRMAN: If we can move --

MR. SHEPHERD: I never got a chance to make a submission on the relevance of this. Hydro's counsel did; I did not. I waited. Can't I make a submission on it?

THE CHAIRMAN: If you want to.

MR. SHEPHERD: Thank you.

Hydro has filed a document that says something which looks like a document has been

requested, and it looks like it is about what has to be fixed in nuclear.

Given that document could have no changes in it from what we heard in Panel 9, in which case there would be no reason for it to be before this Board, and that would be a perfectly legitimate answer for these witnesses or for Hydro to give.

However, if it does have changes in it, then that is changes to evidence that is before this Board, and I believe that as a matter of clear law all of the parties here and the Board are entitled to see that.

If it does not have changes, they can say it doesn't have changes. I'm happy.

If it does have changes, I don't see where there is an issue here.

THE CHAIRMAN: Well, I did suggest a way in which you could get the information you need. I will not let you ask any more questions in that context.

It seems a simple thing to ask them. If there have been any changes in those matters since the Panel 9 evidence, that is a simple question to ask them, and they can answer it or undertake to find out.

MS. HARVIE: I think the answer is quite

clearly stated on the record at other times -- I'm sorry, it appears at page 21 of Exhibit 796 it says:

> There has been no significant change in the information regarding major supply options since Panels 7, 8, 9 and 10.

MR. SHEPHERD: I didn't think I was talking about major supply options. I thought I was talking about existing system. But I may be wrong here.

In any case, Mr. Chairman, with your ruling I have no further questions of this panel.

THE CHAIRMAN: Who is next?

MR. NUNN: Mr. Grenville-Wood.

THE CHAIRMAN: Who is after Mr. Grenville-Wood? Mr. Watson?

MR. WATSON: I am, Mr. Chairman.

THE CHAIRMAN: Are you ready to go?

MR. WATSON: No. I wasn't expecting Mr. Shepherd to leave us this early.

THE CHAIRMAN: We will adjourn until tomorrow morning at nine o'clock.

THE REGISTRAR: Please come to order. This hearing will adjourn until nine o'clock tomorrow morning.

---Whereupon the hearing was adjourned at 2:39 p.m., to be reconvened at nine o'clock on Tuesday, January 12th, 1993.

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